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CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society Of America

Vol. XXV MAY-JUNE, 1953 No. 3

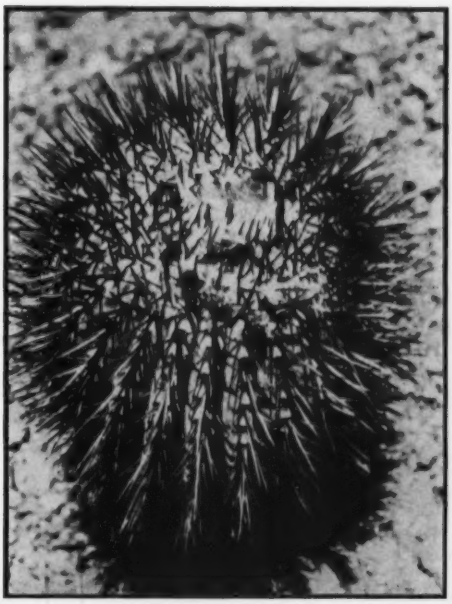

FIG. 47. *Copiapoa cinerea, ca.* ⅓ nat. size, apical view of long-spined form with 2 centrals and 4 to 6 radial spines. Habitat photo, kodachrome No. 205. Cf. pg. 70

CACTUS AND SUCCULENT JOURNAL

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CONVENTION NEWS

Your Convention Chairman has been too busy finishing up the last details, to write a glowing account of what is in store for you at the Convention. Just take his word for it, that this will be the best one yet. Look for the details in the information sheet which should reach you by mail in the middle of May. Probably as you read this, your chairman will be in the southern part of Mexico making kodachromes to show you at Palm Springs. Remember the dates. July 10-12 at Carpenter's in Arcadia, July 13 on tour to Santa Barbara, July 14-15 on tour to Palm Springs and the Devil's Garden.

See you in July.

Note: If any JOURNAL subscriber has not received a special letter giving full instructions about the Convention write for one to Homer Rush, 820 W. 115 Street, Los Angeles, Calif. HOWARD E. GATES

CONVENTION ISSUE

The July-August JOURNAL will be mailed previous to the Convention and will contain a feature article on the Succulent Garden of the University of California, Berkeley. There will also be articles on Society history, James West, and the program of the Convention.

GARDENS TO VISIT

I have the pleasure to report that the cactus garden of A. J. Haverland, San Marcos Rd., Box 603, Santa Barbara, Rural Rt. 1, Phone 8-3214, is open for inspection at any time. The garden is ideal from the standpoint of exposure, soil and drainage and was set out some 20 years ago.

My garden is likewise open to inspection at any time. M. C. Richter, 1501 Mission Canyon Rd. (end of road past "Botanic Garden") Santa Barbara, Phones 2-8381 and 2-3321. It is of recent origin exception the greenhouse collection which formerly was owned by the late Mrs. William H. Otte of this city. Early readers of the JOURNAL will remember her.

W. C. RICHTER

J. W. Dodson, 721 Edgewood Rd., Redwood City, California. Entire collection consists of Haworthias. Convention visitors welcome.

LIBRARY NOTE

Due to a much needed vacation and to the coming Convention of the Cactus and Succulent Society of America, Inc., which the Librarian wishes to attend, the Society Library will be closed and no books available from June 1st until July 15th, 1953. Please see that all books borrowed are returned by June 1st so that fines will not be charged against you. Orva Bokarica has done a wonderful job of getting this Library into condition for members use. Am sure all members will enjoy meeting her.

ETHEL RUSH, *Secretary.*

AMENDMENT TO THE BY-LAWS

A new section, to be known as Section No. 4, to be added to Article IX, to read as follows:

a—For those Affiliates having a membership of 50 members or less; the Affiliates must take out and maintain a yearly Sustaining Membership in the Cactus and Succulent Society of America, Inc., of not less than $5.00. Those Affiliates having a membership of 51 members or more; the Affiliates must take out and maintaing a yearly Sustaining Membership in the Cactus and Succulent Society of America, Inc., of not less than $10.00.

b—It shall be the duty of each Affiliate to maintain a subscription to the Cactus and Succulent Journal in the name of the Affiliate and do also everything possible to induce as many members as possible to take out their own personal subscriptions to the Cactus and Succulent Journal.

c—The Affiliate shall appoint or elect each year a competent person who will act as reporter or correspondent for that Affiliate and may send in to the JOURNAL, for use in the Affiliate column monthly reports of the meetings, the plants discussed, the field trips taken, the garden visited, the collecting trips taken, the collections viewed and the most outstanding plants seen. Only articles relating to plant material of acceptable nature will be used.

This reporter shall also send in separately, whenever possible, cultural notes about methods of growing used by the different members of the Affiliate and the results obtained by the use of these methods.

d—It is recommended that each Affiliate endeavor to send or help to make possible the attendance of a Delegate at each Convention held by the Society whenever possible. These Delegates to be specifically instructed to present the views of the Affiliate at the Convention. The Affiliate shall notify the Convention Chairman, in advance of the Convention, giving the name of the Delegate or Delegates chosen by them.

This amendment was acted upon favorably by the Executive Board of the Cactus and Succulent Society of America, Inc., at the January meeting, held January 18th, 1952. ETHEL RUSH, *Secretary.*

STUDIES OF SOUTH AMERICAN CACTACEAE

3: Variation in Copiapoa cinerea (Philippi) Britton & Rose

By P. C. HUTCHISON[1]

Copiapoa cinerea (Philippi) Britton & Rose is a little-known endemic restricted to a narrow coastal belt in northern Chile bordering the Atacama Desert in the southern part of Province Antofagasta. Johnson (6) lists 16 species of Cactaceae from this area. Of the 12 echinocactoid species in this list, *C. cinerea* is the most conspicuous and widespread. It is also highly polymorphic and appears to intergrade with an undescribed, caespitose species in the southern part of its range, and with *Copiapoa marginata* (Salm-Dyck) Brit. & Rose in the north. In herbaria these intergrades have been variously determined. At least one new species (*C. gigantea* Backeberg) has been based on a plant from one of the outlying populations in the northern range of *C. cinerea* (1, 2, 3). Another taxon (*C. haseltoniana* Backeberg, *nom. nud.*) has been proposed for a yellow-spined variant of *C. cinerea*. These two taxa will be discussed in a later paper. The purpose of this paper is to clarify typification of *C. cinerea* and to present data on natural variation in a population in Quebrada Taltal and adjacent hills, an area which presumably includes the locality of collection of the type. Field studies were made in January, 1952, during the University of California Botanical Garden Expedition to South America, 1951-1952.

Philippi's original description (7) of *C. cinerea*, as *Echinocactus cinereus*, reads:

"E. omnino cinereus diametri 4-pollicaris; costis numerosis; verrucis vix 2 lin. inter se distantibus, diametri 2½ lin., vetustioribus im-

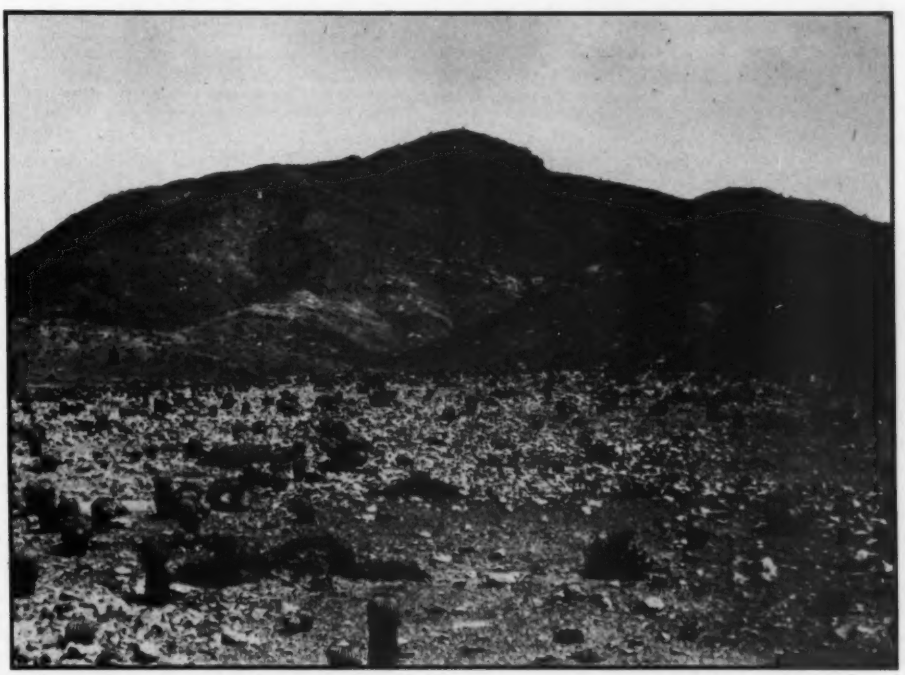

FIG. 48. A plateau population of *Copiapoa cinerea* (Phil.) Brit. & Rose midway between Taltal and Breas, Dept. Taltal, Prov. Antofagasta, Chile. The cereioid cactus in the background is *Eulychnia iquiquensis* (Schum.) Brit. & Rose. Habitat photo from kodachrome No. 197.[2]

[1]University of California Botanical Garden (Berkeley) Contribution *No. 129.*

[2]Unless otherwise indicated the photographs of this species which follow were taken in this population. All photos by author.

FIG. 49. *Copiapoa cinerea* with *Eulychnia iquiquensis* in rocky hills of the north slopes of Quebrada Taltal *ca.* 2 km. west of Breas near the eastern limit of coastal vegetation. Habitat photo from kodachrome No. 191.

mersis, planis; aculeis 5-6, nigris, teretibus, supremis duobus parvis, circa 2 lin. longis, inferioribus circa 6-8 lin. longis, centrali 9-10 lin. longo; apice lana alba densissima, 9 lin. longa tecto, flores plures vix 3 lana emergentes, 9 lin. longos, flavos emittente. In litorali a valle Taltal a 25°24' lat. m. usque ad Cobre 24°15' lat. m. frequens, inter majores recensendus, valde ramosus, massas interdum diametri 1½ ped. formans."

No type has been designated in the literature. Judging from the confusing array of annotation labels on the various specimens of the type collection which I have seen, some elaboration of the history of the dried material which Philippi collected is necessary, since my choice of a lectotype differs from that of Rose. Rose's choice was later reiterated by Dr. Carlos Muñoz P., who annotated Rose's choice as "Typus" and photographed this sheet at Santiago (SGO No. 041282) for distribution to other herbaria. My citation of the Philippi collection preserved at Santiago follows, and an explanation for it and the complex history of the sheets examined is given immediately thereafter.

Chile, Prov. Antofagasta, Dept. Taltal, Quebrada Taltal, "Hueso Parado," *R. A. Philippi,* Dec. 14-15, 1854 [Herb. of F. Philippi No. 791] (SGO No. 502667-lectotype; SGO No. 041282-isotype, US-fragment).

Rose examined the material which Philippi collected and deposited in the Herbarium of the Museo Nacional de Historia Natural, Santiago, Chile. At the time Rose saw it, this material was unmounted and there were three labels for it, each with slightly different data. These labels read, respectively, "Hueso parado. Decembri 1854 Ph.," "Des. Atacama," and "Dr. R. A. Philippi leg. Taltal in des. Atacama. Herb. F. Philippi 791." Rose apparently assumed that these labels referred to different collections and that the material, which showed considerable variation in spine morphology, represented more than one species. He separated from this material several areoles which showed spination which agreed most closely with Schuman's plate of this species (8) and took a fragment from his separation which is now mounted at the National Herbarium, Washington, D.C. (US). The remainder at Santiago was mounted later as SGO 041282, and Dr. Carlos Muñoz P. annotated it as the "Typus" for *Echinocactus cinereus* Philippi. I examined SGO 041282 at Santiago in 1952 and the fragment from it at U.S. Nat. Herb. in 1951 and this material is definitely taken from a single plant which was atypical of *Copiapoa cinerea* in a population at type locality (cf. notes on variation below) and further, does not fit Philippi's description. It may be described briefly as follows: areoles with

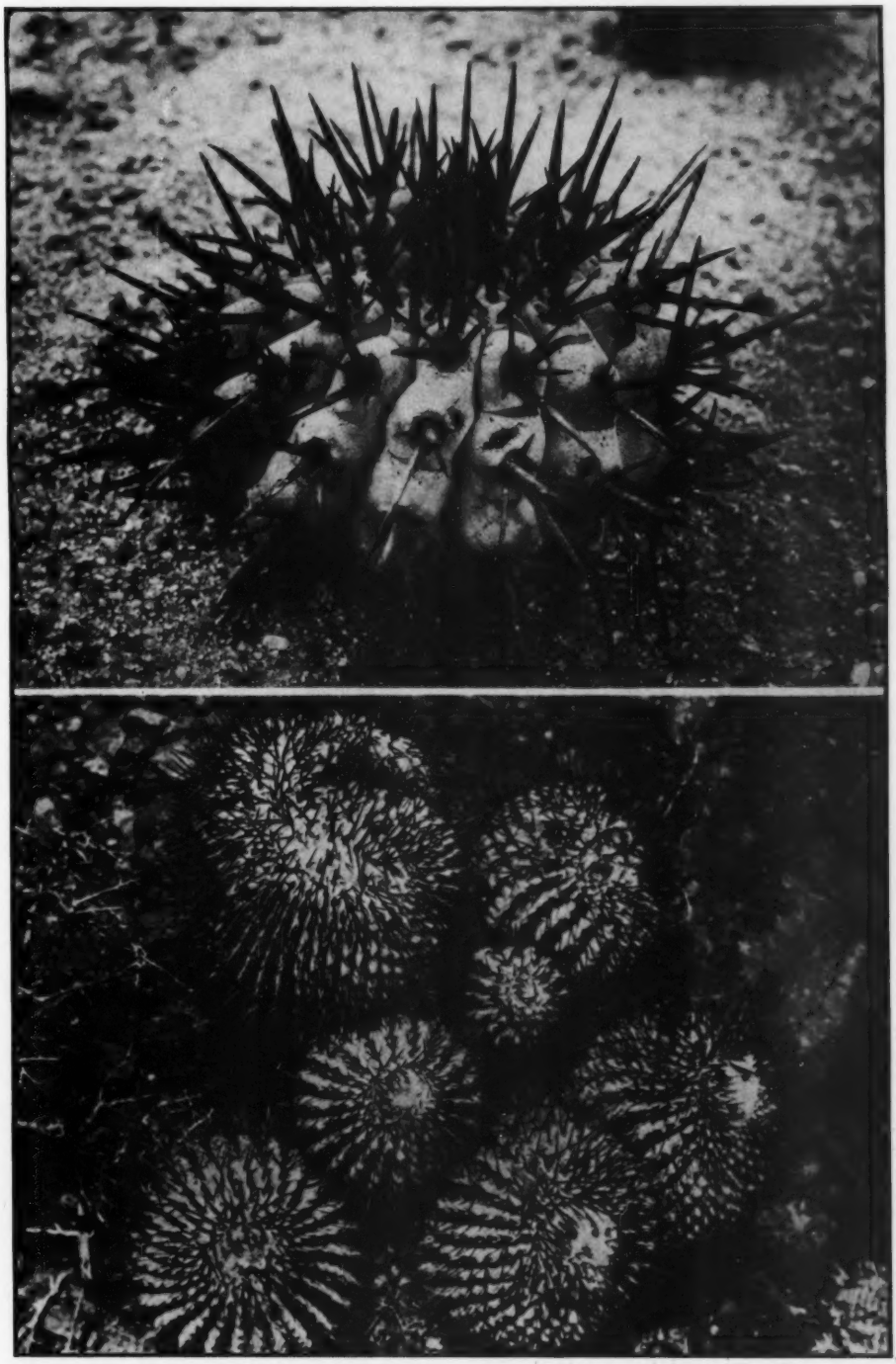

FIG. 50. *Copiapoa cinerea,* cutting of an apical offset (one of 29) of a large plant with 19 branches from 2 km. west of Breas, showing two central, and 2 to 6 radial spines. Photo, nat. size, at Univ. Calif. Bot. Gdn. (Berkeley), Dec. 1952.

FIG. 51. *Copiapoa cinerea, ca.* 1/6 nat. size, a tall (0.8 meters) plant with one fasciated stem 2 km. west of Breas (cf. text). Habitat photo from kodachrome No. 194.

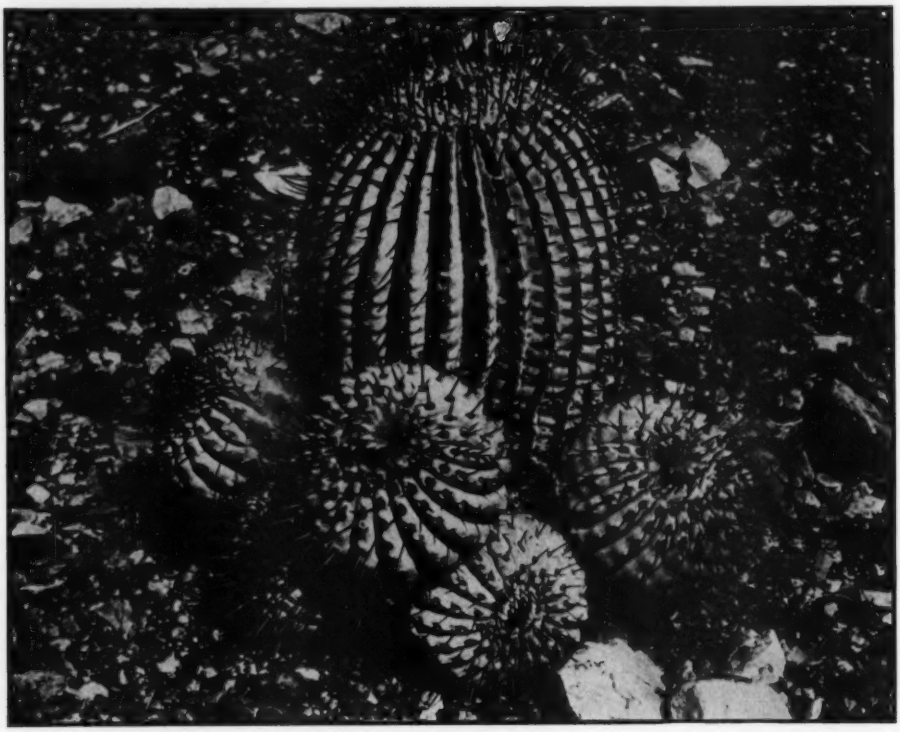

FIG. 52. *Copiapoa cinerea, ca.* ⅓ nat. size, a plant with mostly one long central spine and no radials. Habitat photo from kodachrome No. 203.

two central spines 12 mm. long, no radials; flower *ca.* 17 mm. long, limb 13 mm. wide. The label chosen (by whom?) for this material and mounted on SGO 041282 reads, "Dr. R. A. Philippi leg. Taltal in des. Atacama. Herb. F. Philippi 791."

The balance of the material left after Rose separated the material of SGO 041282 (and the fragment of it at US) was eventually mounted at Santiago as SGO 052667 and bears the label "Hueso parado. Decembri 1854 Ph." Rose's annotation label "a mixture here" is now mounted on this sheet. This material may be briefly described as follows: rib section of 8 areoles, central spines two, 19 to 22 mm. long, radial spines 3 to 6, 3 lower radials 12 to 15 mm. long, the central lower one usually 1 to 3 mm. longer than the two lateral ones, 3 upper radials much shorter (up to 4 mm. long) but occasionally 1 to all of the upper radials missing, flowers as in SGO 041282.

Rose's concept of this species, which he did not study in its habitat, was apparently largely based on Schumann's figure (*l.c.*) of a plant with usually one or two short central spines and no radials (cf. fig. 55). Philippi, however, describes his *Echinocactus cinereus* as having 5 or 6 spines, so apparently his concept was based primarily on the material now mounted at Santiago as SGO 052667, which Rose, and later, Muñoz, considered to be of another species, or at least atypical of *C. cinerea.* As is shown below, all of the Philippi material falls within the range of variation in a population of *C. cinerea* at the type locality, but it was apparently taken from two different plants. Rose correctly separated the material from these two different plants, but was in error in assuming that what was left represented a different species. In fact the material left is the most typical of *C. cinerea* and since it fits Philippi's description more closely, it should be designated the lectotype (i.e., SGO 052667).

As to the proper locality for the type collection, and the status of the three available labels, it is my opinion that F. Philippi, (R. A. Philippi's son) wrote out additional labels for this material for his herbarium and casually altered the data each time. The data on all labels could equally well apply to one locality, indeed there is a hierarchy of specificity with regard to that locality as is readily seen by the following in-

formation on the localities concerned.

Johnston (6) reports that Philippi collected in Quebrada Taltal on Dec. 14th and 15th, 1854. He labeled all specimens taken these dates as "Hueso Parado." His campsite was recorded as "Agua del Clérigo" which is probably either one of the two localities now known as Agua de Perales (a spring on the south base of Cerro de Hueso Parado) or Agua de la Lora (a spring in a quebrada of the southeast flank of the same mountain, now known as Cerro Perales). While at this station he collected from there to the shore now called Caleta de Hueso Parado. His collection of *C. cinerea* must have been taken inland near his camp, however, since the shoreline populations of *C. cinerea* have generally longer, thinner spines which are brownish or yellowish (cf. *P. C. Hutchison 401*, UC) rather than black or grey as is typical of inland populations of this species, as well as of Philippi's herbarium material. Since one of the two plants which Philippi preserved has no radial spines, it is likely that it was taken in one of the plateau populations on the flanks of Cerro Perales in Quebrada Taltal, for as is mentioned below, forms with no radial spines were found by the author only in plateau populations and those on the slopes above were always more spinose and always bore radial spines. Forms with radial spines, conversely, do occur in the plateau populations, and probably Philippi took his material of this type of plant (designated above as lectotype) from a plant nearby the one from which he took the material with no radials (SGO No. 041282).

In January, 1952, the author found *Copiapoa cinerea* abundant on level rocky plateaus, slightly raised above quebrada bottom-lands, 10 km. east of Taltal in the Quebrada Taltal (cf. fig. 48), and again on similar plateaus 5 to 10 km. inland in the Sierra Esmeralda 30 to 50 km. to the south. It occurs in less dense stands and often as isolated individuals on the hills above Quebrada Taltal and extends from there continuously over the coastal range, reaching the coast about 5 km. north of Taltal, then receding into the hills about 15 or 20 km. north of Taltal. In Sierra Esmeralda its distribution, as far as known, is almost exclusively on small inland plateaus, rarely on hillsides, and apparently not at all on the coast. I was unable to confirm its distribution further north than Quebrada Guanillo above Paposo although, as stated above, Philippi records it as far as Cobre and Johnston (6) reports it "in the region north of Paposo." In its densest stands on the plateaus it is rarely associated with any other cactus but on hillsides a common associate is *Eulychnia iquiquensis* (Schum.) Brit. & Rose.

Most plants are columnar, to 1.3 meters tall, usually single or with 1 to 5 branches commonly from the base (cf. fig. 49). There is little or no variation in stem shape. One extremely large plant examined in the hills 2 km. west of Breas (*P. C. Hutchison No. 394*) had 19 branches from the base, each about a meter long, with 29 smaller branches from the apex of these stems (cf. fig. 50). In this same area I found the only examples of fasciated stems which were observed in any population of *Copiapoa*—about ten large plants each with 3 to 8 stems *ca.* 1 meter tall, and with 1 to several stems fasciated (cf. fig. 51). These are apparently the first examples of fasciation to be reported in *Copiapoa*. Several of the fasciated stems were in flower. It was interesting to find that these fasciated plants were all growing together at the top of a narrow, steep gorge cutting the slope of the sides of Quebrada Taltal, and apparently occurred nowhere else. I could find no evidence that an environmental factor was responsible for the fasciated stems. They were not isolated from normal plants.

On the slightly elevated, flat plateaus of lower altitudes (cf. fig. 48) where *C. cinerea* is most abundant the plants are usually smaller, seldom more and generally less than 0.7 meters tall. A single main stem is most common, with subsidiary stems from the base or, in most cases, from the lower half of the plant, being half as long or less. Occasionally a cluster is found in which all stems are of uniform length and form a mound (cf. fig. 54). The smaller size of the plants in plateau populations is probably attributable to a scarcer water supply. The plateaus were below the lower limit of the winter fogs,[3] whereas all of the largest specimens examined on the sides of the quebradas grew in the fog zone.

Britton and Rose (4) used the number of ribs as a key character for distinguishing species of *Copiapoa*. Subsequent authors have considered this character to be diagnostic for some species of this genus. In *C. cinerea* the variation in number is at least from 14 to 30. Number of ribs is probably correlated with age and size of the plant as influenced by climatic conditions, since the oldest plants in the most favorable habitats had the largest number. The various stems of a single plant show little variation in number when they are of equal size (usually a variation of 0 to 3 ribs), but when different stems of one plant are of various sizes (and, presumably, ages) the variation is larger. Areoles may be nearly approximate or up to 2 cm. apart. The epidermis in all specimens examined was always ash-grey.

[3]Winter sea-fog (called "camanchaca") is apparently the primary source of water in most years; rain is rare in this area.

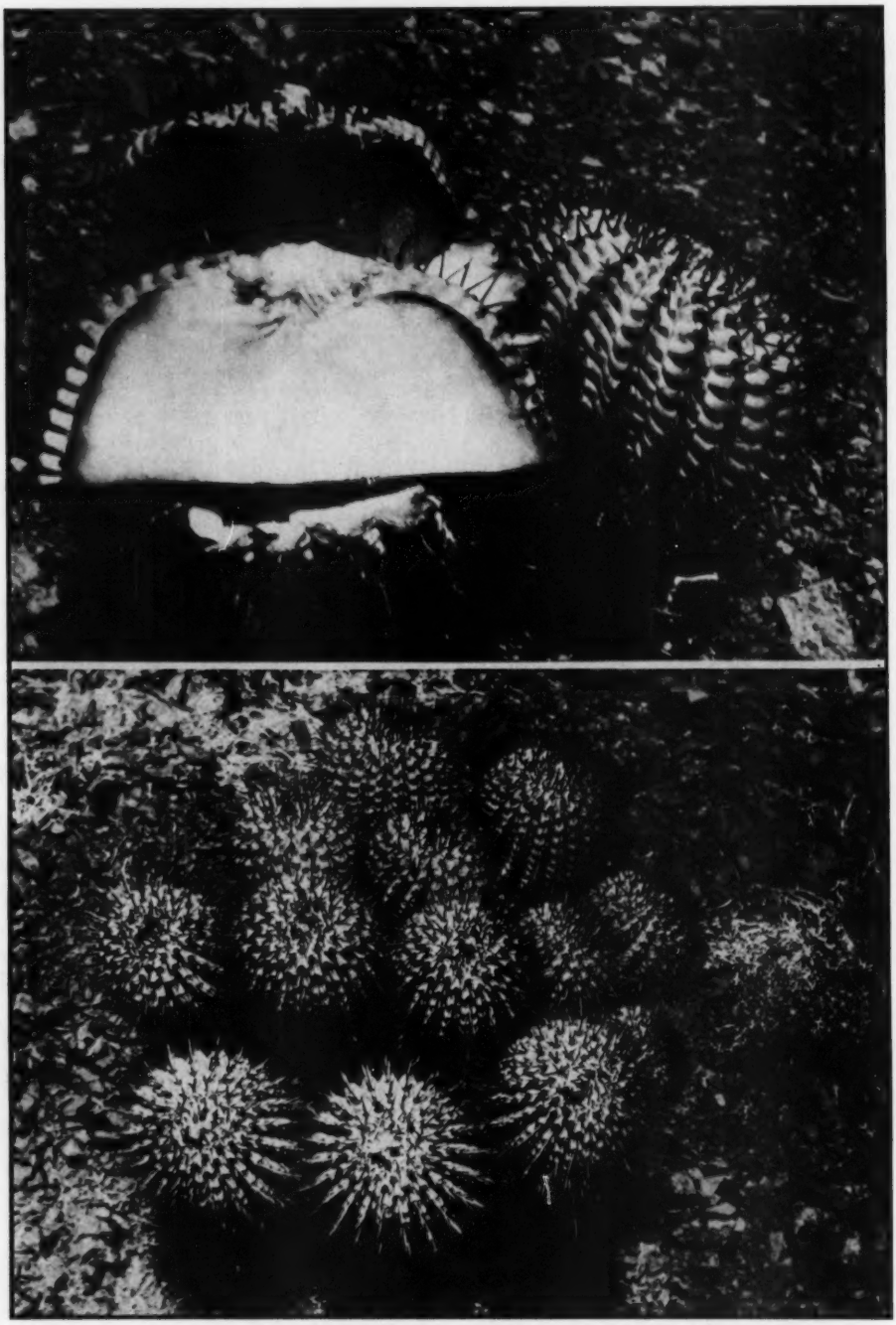

FIG. 53. *Copiapoa cinerea, ca.* 1/3 nat. size. Apical longitudinal section showing retuse apex of plant beneath apical wool; plant with 2 central, no radial spines. Habitat photo from kodachrome No. 198.
FIG. 54. *Copiapoa cinerea ca.* 1/6 nat. size. Apical view of a caespitose plant with 23 ribs. Habitat photo from kodachrome No. 200.

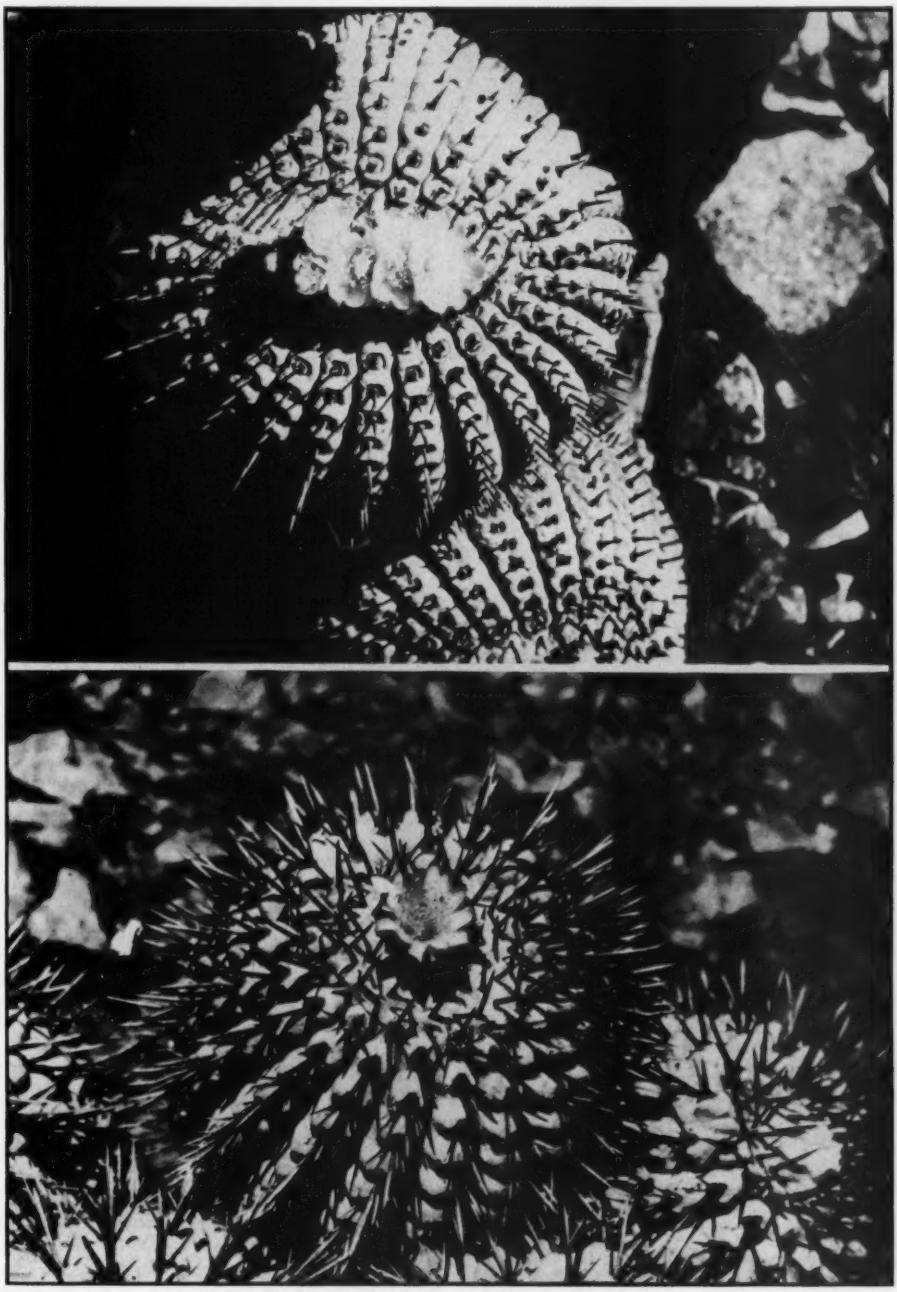

FIG. 55. *Copiapoa cinerea, ca.* ½ nat. size. Apex of flowering plant with 27 ribs, single short central and no radial spines. Habitat photo from kodachrome No. 206.

FIG. 56. *Copiapoa cinerea, ca.* ½ nat. size. Apex of flowering plant with 21 ribs, two central and 2 to 4 radial spines. Habitat photo from kodachrome No. 201.

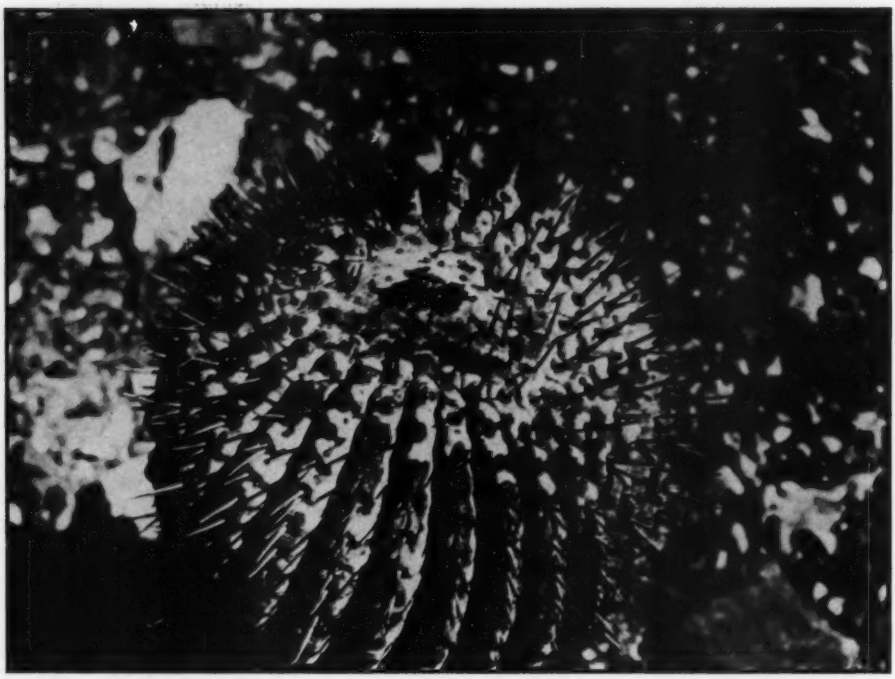

FIG. 57. *Copiapoa cinerea, ca.* ⅓ nat. size; plant with 1 or 2 central an dno radial spines, long-spined form. Habitat photo from kodachrome No. 203. Note seeds scattered over apical wool.

Central spines are either one or two, most often the latter, with the uppermost spine appearing first and often attaining greater length; length varies from 1.3 to 3.3 cm. Radial spines may be lacking (rare), or from 1 to 7, but commonly 2, 4 or 6; length varies from 0.5 to 2 cm., but radials are usually shorter than the centrals. On most specimens there is fluctuation in spine pattern on various parts of a single stem, the only notable exception being plants with a single central and no radial spines (cf. figs. 52, 55). When radial spines occur the number of centrals may vary at random between one and two on a single stem, two being more common. In general, plants at higher altitudes on the quebrada slopes within the fog belt are more heavily armed with stouter and longer spines and bear at least 2 centrals and 4 or more radial spines (commonly 4, 5 or 6). Nearer the coast and at lower altitudes in the plateau populations, spines are much shorter and plants with 1 or 2 centrals and no radials occur. There is considerable variation, however, even within the general limits described above, but not exceeding these limits—*i.e.*, 1 or 2 centrals, with 0 to 7 (usually 2, 4 or 6) radial spines.

There is no consistency in arrangement of spines in any particular area other than as pointed out above and the dominance by numbers of plants with radial spines occurring in pairs.

At all localities spines are extremely brittle, especially the older (lower) ones. The lower half of most old stems is usually completely naked due to loss of these brittle older spines. Spines are usually black, fading to grey-black or grey, but at one locality *ca.* 20 km. north of Taltal on the coastal road to Paposo some plants bore brownish or yellow-brown spines which became, under cultivation, more markedly yellowish[4] (cf. *P. C. Hutchison 401,* UC, also cultivated at U. C. Bot. Gdn., No. 52.585 and No. 52.585S).

Flowers of *C. cinerea* are 1.7 to 3.5 cm. long and 2.0 to 3.5 cm. wide across the spread limb; generally length and width are about equal. Color ranges from yellow to yellow shaded pink to dark red on the outer surface of the petals. Flowers of a single plant are usually of the same size and color, but variation occurs between flowers of different individuals. No significant variations in morphology, other than size, were

[4]This form has been called *Copiapoa haseltoniana* Backeb., *nom. nud.*, in *Cact. & Succ. Jour. Amer.* 23 (4): 119, 1951.

noted. Both flowers and fruit have a mass of white or cream-colored hairs attached to the base below the ovary. In extracting flowers from the stem apex I found that this hair is often not attached, as it is apparently more strongly affixed to the areolar tissue than to flower tissue. The individual strands of hair in *C. cinerea* are ± 2 cm. long.

The fruit is cream-colored tinted pink, to almost pure carmine, naked or more usually with 1 to 5 short, erect, deltoid to lanceolate bractlets at the truncated apex and occasionally with a few smaller bractlets subapically. These bractlets may be lost during development. The ovary is at first totally immersed in the densely matted hairs of the stem apex. Shortly after fertilization it begins to color. As it matures it swells upwards until finally the apex is almost flush with or a mm. or so above the surface of the apical hairs. The perianth dries and is at first persistent on a circular disk at the apex of the ovary. Dehiscence is usually accomplished by the drying of this disk prior to the drying of the ovary walls. As the disk shrivels it breaks from the sides of the walls of the ovary; later it is attached by a very narrow section to one side and may be lifted at an angle above the ovary. The withering-persistent corolla usually breaks

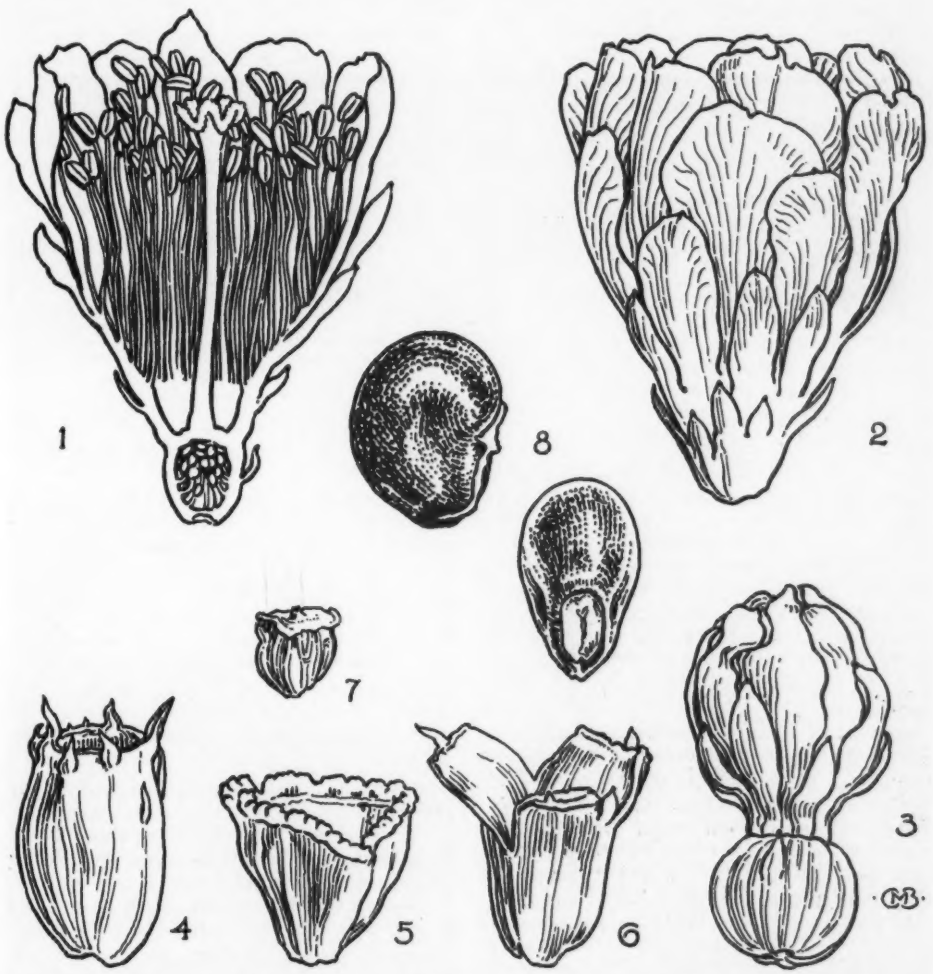

FIG. 58. *Copiapoa cinerea* (Phil.) Brit. & Rose. 1, 2. Flower, side-view and cross-section. 3. Fertilized ovary with persistent perianth beginning to wither. 4. Dehisced capsule. 5-6. Abnormal capsules which continued to grow after dehiscence. 7. Capsule which dried without dehiscing. 8. Seed. 1-7, x 2; 8, x 20. Wool, sub-basal to flower and fruit, has been omitted to enable presentation of floral details.

away in the wind at this time. Attachment of the flower to the disk is always weaker than that of the disk to the ovary; if the withered flower is grasped, it usually pulls away and the disk remains. As the disk first ruptures seeds are extruded through the narrow opening and, in most cases, these seeds are still attached by the funiculus to the placentae, or at least, the broken funiculus remains attached to the hilum. In the sun the fleshy remnants of the funiculus dry rapidly and the seed becomes scattered over the apical wool (cf. fig. 57), to be blown away or eventually to drop to the base of the plant. As dehiscence nears the halfway point, the ovary begins to dry up and shrink back into the wool; the disk and attached flower usually break away at this time. As the capsule shrivels, all seed is extruded or some may remain, so that a dried capsule may be empty or contain seed. The dried capsule is usually again totally immersed in the matted hairs of the stem apex.

Occasionally the disk may not rupture and the capsule dries about the seed without dehiscing. The capsule is later disgorged and lies on top of the apical hairs of the stem. This dried capsule is round or oval, very brittle and tough, and solidly filled with seed (cf. fig. 58-7). The withering-persistent flower, in such cases, becomes lost before the capsule is disgorged. Capsules which have lost their disks sometimes continue to grow and are usually distorted in shape and fissured by pressure against surrounding structures (cf. fig. 58-5, -6).

Plants in the plateau population 10 km. east of Taltal were infested with a scale insect (*Diaspis* sp.). The infestation was most severe on young plants or on young basal offsets of mature plants. No infestation by scale insects was noted at any other locality. There was no evidence of infestation or damage to *C. cinerea* by any Buprestidae, as has been demonstrated (5) for *C. humilis* (Phil.) Hutchison and *C. taltalensis* (Werd.) Looser.

In summary, it has been shown that variation in certain characters, previously presumed to be diagnostic and static, of the Chilean endemic species *Copiapoa cinerea* (Phil.) Brit. & Rose, is extremely wide. This is particularly true with reference to habit, ribbing, areole placement, spine number, size, arrangement and color, flower color and size, and finally, fruit color and morphology. Conversely, there was little variation in general shape of stems, epidermal color, details of floral morphology other than size and seed morphology.

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COLORADO CACTOPHILES

After holding informal meetings during the past two years, we decided to organize under the name of Colorado Cactophiles in time to be officially represented at the forthcoming fifth biennial Convention of the Cactus and Succulent Society of America. The January meeting was largely taken up with the formalities of organizing and was held at the M. L. Willis home. February meeting was cancelled due to a mild epidemic of virus X.

The March meeting, at the Heacock home, really started the ball rolling as to program and activities for the future. The study topic was Aloes, Haworthias and Gasterias. Mr. Tomlin was the speaker and displayed a large number of the plants discussed. Mr. Tomlin then reported that he had offered the active support of Colorado Cactophiles in developing a cactus and succulent area for the proposed arboretum at City Park. The offer was enthusiastically accepted.

Mrs. Willis reported on the possibility of the Cactophiles participating in the huge All Hobbies show at City Auditorium next September. We voted to do so and she was appointed as our representative on the planning committee for that show. The art chairman, Mrs. Heacock, submitted designs for club stationery. All stationery is hand done by Mrs. Heacock. All honorary members and Colorado citizens desiring membership may purchase paper for personal use, proceeds to go to the Club treasury. An auction sale of plants and planters donated by all members, and hand painted handkerchiefs and tea towels bearing cactus designs executed by Mrs. Heacock, produced spirited bidding and a sizeable addition to the treasury. Part of this money was used for the purchase of a junior Viewmaster projector, films, and textbook which will form the basis for group study during the next few months.

* * *

The program of the meeting held April 14 in the home of Mr. and Mrs. G. J. Tomlin was on Epiphyllums and kindred types of cacti. Mrs. William Rutschman first reviewed an article on this subject by Mrs. Cactus Pete. Miss Ellen Heacock then showed the Viewmaster reel illustrating *Disocactus Eichlamii, Lepismium cruciforme, Rhipsalis* (several species), Orchid Cacti Paula Knebel and Rosetta, *Nopalxochia phyllanthoides,* and *Chiapasia Nelsonii.*

Following this a short period was devoted to drill in spelling and pronunciation of these names and related terms, as follows:

DISOCACTUS: Epiphytic cactus. From the Greek meaning "double," referring to the arrangement of the perianth segments. Perianth meaning the floral envelope consisting of calyx (sepals or outer series of floral envelope) and corolla (inner series or petals). Flowers small, red, diurnal. 2 species: *D. biformis,*

from Honduras; *D. Eichlamii* from Guatemala. Same treatment as *Rhipsalis*: warm, moist, partial shade. Leaf mould, old cow manure, sand, loam. Top with moss.

LEPISMIUM: Epiphytic cactus in the subtribe *Rhipsalidanae*. From the Greek meaning "scale." Grows in rocks with many long branches hanging or creeping. Flat and leaf-like or 3 winged. Flowers white or pink. From Brazil and Argentina. Br. & R. put 4 variations under *L. cruciforme*, but Borg believes them to be separate species.

RHIPSALIS: Tropical epiphytic cactus. From Greek meaning "wicker work" referring to the slender, pliable branches. Only apparent exception to the American distribution of cacti, but general belief is that seed were carried by birds to Africa and Ceylon.

ORCHID CACTUS: Hybrid Epiphyllum. Epiphyllum is a tropical epiphytic cactus. Phyllocactus is a synonym. From the Greek meaning "upon a leaf," based on the erroneous supposition that the flowers were borne on a leaf instead of flattened stems.

NOPALXOCHIA: Monotypic or one-species of cactus from Mexico or Colombia. It and its hybrids are known as the "German Empress." Blooms are pink, red, or orange. Sweet scented. Lasts 3 weeks or more. Name from the ancient Aztec.

CHIAPASIA: Named for Chiapas, Mexico. Only one species—*C. Nelsonii*. Without spines. Margin crenated, meaning notched, scalloped or rounded projections. Large flowers.

NOTE—While this information is available in many reference books, it takes considerable time to assemble, so we include it in this report as a handy review. References: GLOSSARY OF SUCCULENT PLANT TERMS—Marshall and Woods., CACTI—J. Borg.

FIG. 59. A view of the Exotic Garden at Monte Carlo, Monaco, photographed by Mrs. Karl Wihtol. The Riviera on the Mediterranean Sea is ideal for growing most any of the cacti and other succulents.

I BECOME A CACTOPHILE

By ELEANOR DORMAN

My awareness of cacti as something of more than passing interest did not result from any sudden misfortune such as tripping and falling headlong into a cluster of these plants. It was much more gradual and absolutely painless. It just happened and that old character, TIME, fostered it.

It all began in 1943 when, in the course of events connected with the recent war, we had established the laboratory in a new location that originally consisted of a building with four walls unbroken in any architectual detail other than by windows and doors. I was working as righthand assistant to the Director of Research, Ph.D. in chemistry. The only unusual thing about this was that the local gentry expected my Boss to know not only chemistry, but everything else pertaining to the allied sciences. Our monthly subscription of technical journals attested to this fact.

Having spent the free hours of the year from the summer of 1942 to that period in 1943 in equipping the interior of the new laboratory, we then began to spend our spare hours on the exterior which was about as attractive as nothing. This first consisted in breaking the wall on the entrance side of the building by adding a very large bay window (13 feet across the span) and then enhancing this effect with flower bins of concrete block structure, decorated with red brick ledges. The same was added to the other side of the entrance so that the bin went around the corner a distance almost equal to its length on the front side. Up to this point, no cacti!

Now we had flower bins, empty it was true, but still they were there. All that was necessary was to select a few appropriate plants to put in them. Inasmuch as they were three courses high and two blocks deep, something of a shrubby nature could be adequately cultivated. The next step was to visit a friend's nursery in order to select suitable and interesting plant species. Since the good Doctor was a plant bug, anyway, this would be something of an undertaking for any nurseryman.

After the better part of the day had passed in our walking through endless greenhouses, exactly five plants had been selected as a beginning. At the corner of the building, and a little to the side, was to be a *Carissa grandiflora,* very suitable to this Florida climate. Next to the Carissa (in the bins, of course), went a ten-foot speciman of *Cereus peruvianus,* just about in the middle, and no one plant has since received as much attention or interested as many passers-by. On the other side of the entrance and adjacent to the bay window went only one plant for the time—a *Ficus repens*—which was to be allowed to grow until most of that wall was covered after which additional plantings would be made. And on the far side of the bay window went a hybrid Bougainvillea. Of the remaining two plants, both of which were tropical trees, one, a Carambola, was set out in the yard where it was hoped that it would form a background for the Carissa when viewed from the front and, at the same time, shield the side of the building from view. Previously, this alley side of the laboratory had been planted with vetiver grass to break the lines of the wall, but this tropical grass is not particularly appealing to the esthetic sense of form and color. The one remaining plant, *Tamarindus indicus,* was selected for an inside garden area adjacent to the bin in which the Bougainvillea was planted.

This was the beginning, insignificant though it was. No sane cactophile would have begun in this manner, but none of these experiences has followed any of the rules, the knowledge of which came much later.

All the flower bins were prepared in much the same manner. Broken building tile was thrown into the bottoms of each and over these tiles was put semi-enriched Florida soil that had been treated (and strongly so) for nematodes. On this was spread sheep manure in a quantity that used a 100-lb bag for the cactus and the Bougainvillea with only a trace (by comparison) going into the third bin which would have only the one plant and that plant one which would send its roots into quite an area underground. The bin for the Cereus was filled to the top with coarse building sand after the two plants had been set into it. That's all except that they were thoroughly watered!

Nothing more occurred for several months and then the Boss went to visit a friend and fellow chemist in the central section of the state. This friend had what he called his "Devil's Garden" which abounded in succulents of all sorts. So, as is often the case, the good Doctor returned to the laboratory with a bit of the following: *Pereskia aculeata, Bryophyllum tubiflorum, Opuntia Burbankii,* and a few other tropical plants. The latter two were added to the bed with the Cereus and Carissa and all have flourished to such an extent that in the ensuing years, countless trimmings have been required. The former was planted in the inside garden (something on the order of a semi-patio) where it also grew abundently and produced fruit by the bushels. Very good tasting fruit, too.

As strange as it may or may not be, after this point there was very little attention given these plants except as plants get attention in the way of water and fertilizer in the normal course of events. So they grew and flourished until, in the second summer, the Cereus started blooming. During this period it had four separate blooming sessions, with several dozen blossoms appearing on the plant in one night, each flowering period lasting from one to two weeks. It was the talk of the neighborhood!

Later, about six pups appeared at or near the base of the Cereus which, in the meantime, was nearly fourteen feet tall. Three of these were cut off for additional plants and were stuck into the same bin immediately, watered and left to take on their normal growing function—which they did. The other three remained on the parent plant. Of course, the Opuntia just plain grew!

This, then, was the beginning of the collection which now comprises at least as many items as the other tropical plants that occupy garden area around the laboratory and in all probability exceed the others so far as individual plants are concerned.

It might truthfully be said, "one cactus does not make a cactophile," but these plants have a way of ensnaring one not only literally, but also figuratively. Once a plant blossoms, practically all who see it are enchanted. So it was with me. Once that *Cereus peruvianus* blossomed, succulents became the prime interest of nearly all in the laboratory—for our Boss has the peculiar type of personality that generally results in his employees liking the same things he likes.

In October of 1946 I took my vacation and sojourned in New York for two weeks. When I returned to the laboratory I found one of the tables covered with cacti and succulents and nary a one had a name. They laid there for days and then one day the Boss, imbued with the ambition and the necessary time went about the task of potting his new possessions. In all good faith, the following method was used for this process.

First, and of a certain amount of basic importance, all the pots (4") were boiled for a few hours and then set out to dry. After this, broken bits of tile were put into the bottoms and a combination of coarse building sand, soil (which had been boiled for about three hours) and sheep manure was used to fill them. The plants were duly inserted, tapped down, watered and set on a long sill in the semi-sun. This was the second step in beginning a collection. Approximately ten plants had been added to the original number—not many, but enough to add the word "collection" to the terminology.

Life at the laboratory became rather hectic during the ensuing months and no one paid too much attention to the plant life thereabouts, but let it be truly stated that quite a number of tropical trees and shrubs had also made their appearance on the property and in the patio garden. The amount of space available was limited and good soil and fertilizer were absolutely necessary. As everyone in Florida knows, you have to go about with a fertilizer bucket in one hand, a water bucket in the other and an insecticide apparatus slung across your shoulder. We didn't have that much time, so succulents had to fend for themselves most of the ensuing year. They did very well, too, except that a mouse ate one (later identified as a Mammillaria of some sort) and it had quite a setback as a result. Otherwise, no unusual events took place.

During the summer of 1947 a young lady originally from Arizona started doing part-time work at the laboratory and, naturally, the Boss began questioning her for information on our nameless plants. Shucks, she didn't know what they were, either.

January, 1948, soon made its entry and our working schedule was still going strong, but in the meantime, through our Arizona employee, Miss X, we had made the acquaintance of *Arizona Highways* Magazine and the pictures and articles by the Proctors which were a revelation, indeed.

Now things began to happen in rather rapid fashion. Miss X suddenly had to return to Arizona to be with her mother during a serious operation and while there, sent a box of cacti to the laboratory. Of course, the Boss was delighted but, in true scientific fashion, he raised the roof when he discovered not one plant was botanically named and the common names had all worked loose so that it was impossible to identify them by a cross-reference which we did not have, anyway.

You know that old adage: Fools rush in where angels fear to tread. We did just that. Again the soil was sterilized and the pots boiled. And again the broken bits of tile were put in the pots and the prepared soil added, but as it was decidedly wet from the treating bath, we set the filled pots aside to drain until no water appeared when a depression was made in the soil. Then we set the sundry cacti into the individual pots, albeit, wet as they could be and not puddle. The soil was tamped down solid about the roots (when these were present) or blunt ends as the case was. The finished pots were then added to those already on the ledge in semi-sun.

But alas! not what an educated cactophyle would anticipate, but nevertheless, misfortune

struck. We knew one of the specimens was a "Hen and Chickens" according to one of the loose tags and we had selected one plant as the most likely candidate for this name. About a week after planting these cacti, we examined them one morning and found that a rat had eaten most of the Hen and Chickens. We immediately took steps to prevent further depredations of this sort. We constructed, after much discussion, a wooden frame of rectangular shape large enough to surround 40 pots and covered all but one of the largest sides with ordinary copper house screen. Then the pots were removed from the ledge onto a table only occasionally in the sun (late afternoon), arranged in rows and covered with our prepared rat protection. Since this area was part of a semi-open shipping department, it was impossible to keep rats out completely, but traps were set in addition to this protective measure.

Even at this point, every experienced cactophile can probably forsee the consequences. In no time at all we began to wonder just what was happening to our cacti—they didn't seem quite green enough. No more rats reached them, of course, but something else was happening and we did not know what it was. March was almost upon us and the two months that had passed did not seem to have made much difference in the general appearance of our plants. They had had one additional watering in the course of these weeks, but we were having a rather damp winter—in a manner of speaking—and February was on the cold side (40° F), also.

We decided right then and there to find out about the Cactus Society that had been mentioned casually by the Proctors in one of the *Arizona Highways*. In March, Dr. Hurst became a member of the Society and purchased with his membership one copy of the small booklet for beginners—25c as I recall. Upon receipt of the latter, all of us devoured it from cover to cover and our immediate reactions was that our beloved cacti (and other succulents) were not getting enough sun! In fact, we came to the unanimous conclusion that from the very beginning everything we had done was directly opposed to everything that should have been done with the exception of sterilizing the pots and soil. True, not one of the plants remaining after the advent of the rat had curled up and died or anything so drastic as that, but nevertheless, we had watered them upon planting, we had so protected them from rodens that no sun reached them and so forth, ad infinitum!

Time out for another conference to map out a plan of action. The good Doctor and I decided right then and there that these plants must go out in the garden where they would have half-shade by being near trees. But where to put them so that they would be protected? It was decided to build a shelf against the wall of the building at about five feet from the ground (south side). This was done so that it was braced against the building and had a protective strip of lumber at the edge to prevent anything knocking the pots over. No sooner said then done—the shelf was put up, stained a dark color and the next day all the pots were carried out and placed thereupon. No water!

At this point we felt very good about the whole thing. We had saved our cacti and everything was fine. The rats would have difficulty getting to them, they were getting sun and air and they would always have good drainage in case of rain. What could be better!

Ha! There is more than meets the eye, my dear readers, in this game of forseeing things. A couple of months went by and although our plants were obviously growing, they were beginning to show other reactions. Perhaps at this point you wonder why we had not purchased the entire gamut of books? The answer is simple—we get some 40 technical journals a month and a certain number of technical books per year and our book budget was taken up for the first six months of the year. Again we all read the little booklet for beginners. Again we came up with an answer. Too much sun—the clay pots were too hot. I have to give myself credit for the solution to this puzzle. It was decided to take some of our good old ever-present Spanish Moss and place it on the shelf so that each pot nested in it. This would surely keep the pots a few degrees cooler than the surrounding air. Again we were successful in our decision. It worked wonders and those plants really sat up and began to grow. In no time at all they were twice their original size and all had been seedlings (apparently). You know, such results make a person feel good, too.

In June, 1948, our friend Miss X left for a summer trip to Arizona. By the time she returned in December we had stretched our book budget and purchased all the "Beginner's Books" and the Glossary. In addition to this, we were gradually buying all the Kodachromes with View-Master and a copy of Marshall's book that goes with them. This was indeed a welcome addition to our library and an interesting one. Perhaps it is going too far, but it was our collective opinions that the books were not technical enough. However, we began to make progress in identification with the help of a few additional catalogues that we had secured from the advertisers in the JOURNAL.

Just about the time we were adding the four

or five "must" books to our library, I decided to experiment with a few dish collections, so in November (1948), I spent a few hours in one of our local nurseries looking over the possibilities. True, these are not much as the succulent plants, with notable exceptions, are not popular here, although they should be. Everyone told us they could not be grown in this part of Florida successfully. Having looked the situation over, I settled for a very ordinary assortment—there wasn't too much choice. Then I went to a local pottery and bought some special pots inasmuch as a friend had once remarked that the main trouble with people who collected cacti was that they always used such uninteresting pots and containers. This observation had taken me completely by surprise, for subconsciously I had been making this same criticism for years without doing anything about it. On this basis, I selected 2 unglazed and 1 glazed pot of distinctly different designs. One, a small, round burnt-brown, 3-inch deep type similar to a nut bowl, was prepared very exactly in accordance to the books I had now read. Broken pots went in first, then charcoal bits, then soil mixed with fertilizer, and last coarse sand. The glazed dish was prepared in like manner, but the oddest of the three was left for something more appropriate to its style.

The following seedlings went into the round dish: 1 *Gastrolea,* 2 *Faucaria tigrina,* 1 *Haworthia cymbiformis,* 1 *Crassula falcata,* and 1 *Aloe,* species not given. The only things I did that was not according to the books was to water the soil and tamp it down solid. One *Faucaria* was setting a seed and the other was just preparing to bloom and to all appearances, the transplanting did not interfere with the latter. I do think it halted the development of the seedpod to the point of actual discharge of seed and prevented one from forming when the second plant had blossomed. Everything in the bowl took hold and started to grow immediately.

As to the glazed bowl, it was of an even more ordinary assortment and quite unorthodox. It contained three different *Sedums*: *pachyphyllum, multiceps,* and *guatemalense.* Then there were 3 *Crassula perforata,* a *Sempervivum,* an unknown from Arizona, a *Stapelia nobilis* and a *Pedilanthus.* Some assortment, isn't it?

About the middle of December, Miss X returned from her summer? in Arizona and presented us with a gift of more Arizona cacti and succulents taken from her father's farm near Prescott. She did not know their names, but we were glad to have them as we immediately recognized two as being the so-called "hedgehog." We concluded that if and when we acquired enough books, we could identify them. You see, we are of the school that believes books are essential tools in anything.

Some of these Arizona plants were put in single pots, some were grouped together in one large pot and the oddest of the cactus specimens were chosen for the very odd container I had saved. It is unglazed, bi-color and in the shape of a hollow log—very interesting. The Arizona soil that had thoughtfully been brought along with the plants was used in potting along with the usual tiles, etc. Yep, these plants are all growing, too, and putting out new growth

I now had three dish gardens, certainly with variety, and it merely remained to see how they progressed. Having watered them at the time of planting, I let all three groups go for about 2½ weeks before adding moisture. Soon I developed a system of watering lightly every seven days, after I had noticed that some of them tended to look a little shriveled if allowed to go longer than this. These three dish gardens were set on the same sunny ledge as that first used. We prevented damage from rats by placing the more juicy, tender plantings in the office each day before closing time.

It would appear, at this point, that some identification should have been made. With the help of all the "Beginner's Books," all the catalogues we had secured from the advertisers in the CACTUS JOURNAL, and the Kodachromes that go with Taylor Marshall's book, we found that we had the following cacti and other succulents among our combined collections:

Ferocactus Visnaga, Aloe nobilis, Crassula perforata, Faucaria tigrina, Pereskia aculeata, Opuntia vilis, O. rufida, O. Burbankii, O. (Ursina?), O. mammillata, O. cylindrica, Astrophytum ornatum, A. myriostigma, Lophophora Williamsii, Echinopsis (rhodotricha?), Lemaireocereus pruinosus, Cleistocactus (Strausii?), Mammillaria ??? (more of this later if there is a sequel), *M. phaeacantha, M. Parkinsonii, Chamaecereus sylvestrii, Pedilanthus marginata, P. tithymaloides, Portulacaria afra,* 2 *Haworthias, Selenicereus ??,* our original *Cereus peruvianus* and those plants named for the dish gardens and not here added.

It is difficult to decide just where one ceases to be a beginner in this hobby and becomes a member of that middle group that bridges to the "old hands" in the game. I consider these latter the connecting link to the actual botanists who make the real worthwhile contributions to the scientific background that is necessary even for a "hobby." Therefore, this is a very good place to take leave of this recital unless more notes on the actual transition are wanted. I leave that entirely to the Editor—he should be acquainted with that crucial point of fact.

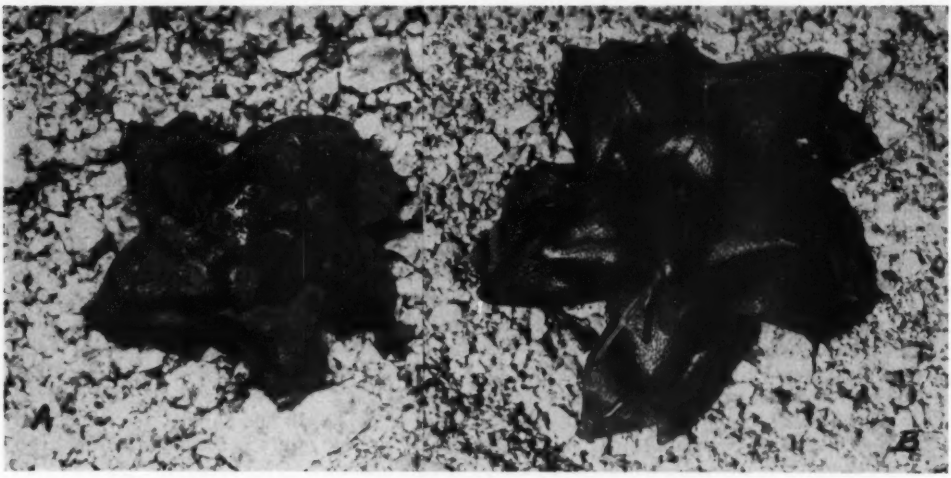

FIG. 60. *Haworthia atro-fusca* G. G. Smith, nat. size.

NOTES ON HAWORTHIAS

By J. R. BROWN

Haworthia atro-fusca G. G. Smith in Journ. So. Afr. Bot. XIV (1948) 41, fig. 1 & Pl. VII.

Plant stemless, to 6.5 cm. diam., not or slowly proliferous from the base.

Leaves about 20, to 4 cm. long, about 17 mm. broad and about 11 mm. thick at base of the flattened end-area, oblong-lanceolate, acute, the inconspicuous, soon deciduous, concolorous end-awn to 3 mm. long; face of leaf below the end-area flat to somewhat concave, smooth, green below becoming dark reddish-brown towards end-area; the triangular end-area 17 mm. long or longer, 17 mm. broad at base, flat to lightly convex, more or less turgid and covered with numerous small concolorous tubercles, dark brown, becoming reddish with age, more or less shining, with 3-5 obscure dark reddish-brown lines, the middle line extending about halfway to the tip, the others shorter; back rounded, smooth, but with a few small concolorous tubercles towards the margins of the end-area, green below, becoming dark reddish-brown above, dull, with about 16 obscure lines; keeled towards the tip and with minute concolorous teeth; margins with small pellucid white teeth.

Locality: Cape Province: Riversdale Distr., between Riversdale and Heidelberg.

"The plant is aptly called *atro-fusca,* because of its dark reddish-brown colour."

A very interesting small Haworthia of the sect. *Retusae* and quite distinct because of its coloring. In the plants seen, the leaves are 3-4 cm. long and some of the older leaves may be 2 cm. broad at base of end-area. The leaves and especially the older ones more or less recurving and slightly falcate towards the tips. In cultivation this sidewise shape of the upper part of the leaves may become accentuated. The tri angular end-area may attain a length of 2 cm. No evidence of a 3mm. long end-awn has been noted on the plants seen and this may be a variable character; some of the leaves having a somewhat obtuse tip and at most a somewhat minute point has been noted at the tip of the leaves. The minute teeth on the short keels may also be white pellucid as are the somewhat longer teeth on the margins. The back of many of the leaves also have several well defined, lengthwise curving rows of tubercles.

Two photographs are shown to illustrate this Haworthia. A shows a plant shortly after being received from So. Africa and which has a somewhat waxy coating on the leaf surfaces, this disappears in cultivation. B shows a plant after a few years in cultivation and at a time when it is growing vigorously as will be noted by its very

turgid condition, however, during the dormant period the leaves lose this turgescence and the end-areas are flatter. It will also be noted that the lines on the end-areas of some of the leaves in plant B are longer, reaching farther towards the tips.

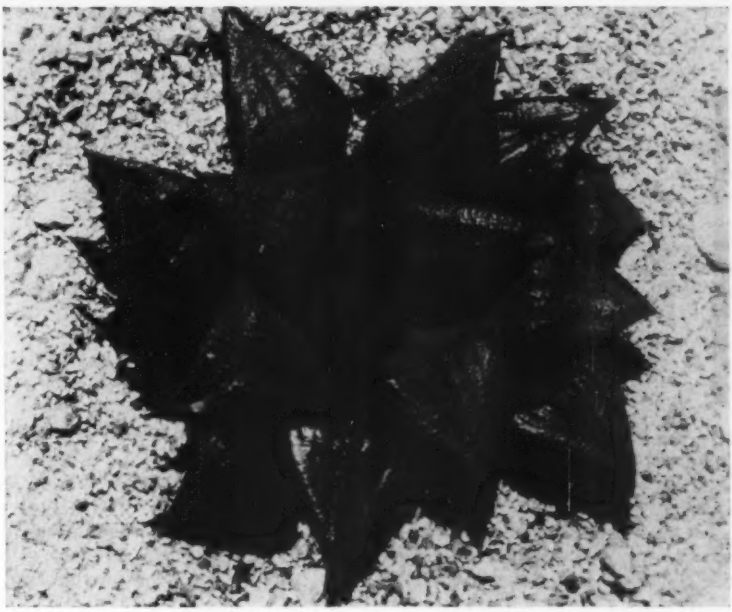

FIG. 61. *Haworthia retusa* var. *solitaria* G. G. Smith, nat. size.

Haworthia retusa var. **solitaria** G. G. Smith in Journ. So. Afr. Bot. XII (1946) 5, fig. 2 & Pl. 1.

Plant stemless, about 8 cm. diam., not or seldom proliferous from the base.

Leaves about 15, 40 mm. long, about 22 mm. broad, about 15 mm. thick at base of end-area, with a whitish, smooth, persistent end-bristle about 5 mm. long; face of leaf in lower part smooth, pale green, the flattened end-area about 21 mm. long, to 22 mm. broad, lightly convex, deltoid acuminate, rough with small concolorous tubercles, dark green, pellucid, more or less shining, with from 9-15 paler lengthwise lines, the middle lines usually extending, or nearly extending, to the tip; back rounded, smooth, light green becoming darker towards the tip, dull; keeled in the upper part, with numerous scarcely to 1 mm. long teeth, which are greenish below becoming pellucid near the tip; margins acute below, more or less rounded on end-area, with numerous, short, reflexed teeth, which are greenish below becoming pellucid near tip.

Locality: Cape Province: Riversdale District.

In his notes about this Haworthia, G. G. Smith mentions: "It occurs about 6 miles north of Riversdale on the Corrente River, growing amongst rocks and practically covered with turf. The plants grow flat, with the retused surface level with the ground, and although found in dense patches, they are all single."

In cultivation this Haworthia (sect. *Retusae*) may attain a diameter of 10 cm., and the end-area of the leaves may be 25 mm. long and 25 mm. broad at the base. While most of the teeth on the margins are reflexed or turned backwards, those quite near the leaf tips are more or less erect. The terminal bristle varies from 3-5 mm. in length.

A CACTUS COLLECTOR IN THE ANDES

An account of a second expedition to the west coast of South America.

By HARRY JOHNSON

PART V

Continued from page 137, Sept.-Oct. No. 5, 1952

Next day we planned to go to Clenddin which is eastward and from there to Balsas which is in the valley of the Rio Maranon, the name given the upper third of the Amazon River. One of the perpetual frustrations of the traveler is to find out how far away a place is. One is given all kinds of answers from very close to very distant, in this case from 70 to 110 kilometers. The kilometer is six-tenths of a mile and is used throughout Latin America. We started in the morning and drove slowly up the switch-back. In the bottom of the canyon where a small stream burbled over the rocks there was some vegetation but the mountain sides were bare for the Indians have cultivated even the steep slopes for many centuries. The plants were of little beauty but some of the small shrubby *Ericaceae* had charming pink flowers. Midway up we passed a collection of mud and wattle huts with the typical grass thatched roofs which was called Encanada. Near the top of the pass which was about 14,000′ were a few round, stone huts with tall, conical, thatched roofs used by the shepherds and also by the farmers who raised barley at these high elevations. On the alto-plano, which is not flat but quite hilly, there were a few groups of *Puya*. This species was caulescent, the rosette of spiny leaves three to four feet high and was nearing the end of its flowering period. The racemes were perhaps two feet long the pale yellowish green, scurfy blossoms compacted and hidden in wool. We travelled till well past noon and then came to where the road forked. We chose the lower, old road which dropped to a valley. A newly built road climbed around a hill. Some distance below two very large boulders were set up in the wheel tracks. After weighing the probabilities we decided there must be a landslide or bridge out below and since we could not turn around slowly backed up the mountain to the intersection and tried the upper road. After an hour or so it disappeared but we followed the truck tracks for a long way out over the grass until they also disappeared in various directions. We had seen no one during the day. It was dusk and spattering rain and as going forward seemed to offer small gain we disgustedly retraced our way to Cajamarca. This was the only time we lost our way.

Cajamarca had been a great disappointment. From what I knew of the adjacent western slopes of the Andes I felt sure this region would be fruitful. Dr. Vargas' time was limited as it was almost time to give the term examinations to his classes at Cuzco so we could not linger. However if I return to Peru I shall go from Trujillo to Huamachuco and eastward to Tayabamba then back to Cajabamba and thence to Cajamarca and, crossing the Rio Maranon, to Chachapoyas in the Province of Amazonas. Above Balsas two collections of globular cacti were made by Weberbauer and published by Vaupel both as *Echinocactus*. Britton and Rose transferred *E. myriacantha* to *Arequipa* principally because the scales on the flower tube and ovary bore long silky hairs. This I think was a mistake because none of the members of the genus *Arequipa* are to be found north of Chala. There are also great differences in the ribs, areoles and spines. Britton and Rose published three new genera in 1922: *Arequipa, Oroya* and *Matucana* each named after the town near which it is to be found. In *Arequipa* and *Matucana* their only distinction was the presence of axillary hairs on the flower tube and ovary of *Arequipa*. *Oroya* differed in having a short-tubed flower naked but with short scales on the ovary, the axils with small tufts of hairs. There are other differences of perhaps more taxonomic significance but they did not have complete material to observe. *Echinocactus Weberbaueri* Rose tentatively assigned to a place near *Matucana* because of its lack of hairs in the axils of tube and ovary scales. In 1948 I found a plant growing in the nursery of Sr. Ruiz in Lima which I brought home and after a precarious time succeeded in grafting and flowering. It proved to be near another plant described by Vaupel in 1913, *Echinocactus aurantiacus*, probably collected by Weberbauer on the same trip. However at that time I could find no record of where my plant had been collected. Britton and Rose tentatively placed *E. aurantiacus* near *Oroya*. It was found near San Pablo in the Department of Cajamarca. Through a probable typographical error they list it as Catamarca which is in Argentina. On this trip I searched

vainly around Cajamarca for the plant. The only cactus I found was *Trichocereus peruvianus* growing in the hedge-rows. Since the Indians often plant this species there is not much use collecting it unless found growing indubitably in the wilds.

We left Cajamarca by the northern pass and within four kilometers of town discovered, growing on a cliff, a globular cactus quite like the one I had flowered from the 1948 trip. This was a really pleasant surprise. It was in full flower the blosoms almost twice as long as the 1948 plant; it also had more ribs and longer spines. These plants are most interesting (I now have three related kinds) and do not fit very closely into any described genus. The ribs are strongly tubercled, broad, low the sinuses very acute; areoles elliptic and placed at the top of the tubercles; flowers scarlet, medium to long-tubed, zygomorphic; tube and ovary with woolly hairs in the axils. They seem to be the most northerly members of the globose *Borzicactus* group. Typically they are solitary plants though sometimes through injury they formed small clusters. Very old plants reached perhaps ten inches in height. North of Lima, John Akers found another species probably related to them but in this case the plants were cespitose in habit growing and appearing somewhat like *Echinocereus triglochidiatus*. In the southern parts of Peru, other odd species occur.

The road to the pass produced no more cacti. The slopes were heavily brush-covered and this type of plant association I have found is seldom good cactus country. At 3,200 meters we came out onto the alto-plano. This high, desolate almost uninhabited country becomes very monotonous to the traveler. It is grass covered with practically no trees or shrubs and at this season before the rains is a withered brown. Here and there are small rosette composites with white or yellow daisy-like flowers. Legumes near Astragalus with lovely blue pea-shaped flowers gladden some of the banks. On some boggy slopes a composite with very large, white blossoms grew in tufts, the foliage quite like an Iris.

Our road was newly made and for an interminable time we drove at five miles per hour over a bed of sharp broken rocks. What it would do to our tires had me worried which was needless as our slow rate of progression brought us through without mishap. We were still climbing and as we reached the second crest there was a series of small lakes. It was interesting to observe that the aquatics were quite similar to our own. *Ceratophyllum demersum, Potamogeton,* sedges and a yellow flowered *Utricularia;* about what one would expect to find in a Sierran lake. On one lake I observed some very large ducks.

Reaching a fork in the road there was a hut. This was used by the few cargo trucks that occasionally came through. There were several Indians about and inquiry brought out that a new short cut would take us to Llapa. It did not look very promising but we decided to chance it. As we drove on it got much worse with truck tracks leaving the "road" where it was impassable and finding their own way. Seeing a shepherd we inquired again in Quechua, which language Dr. Vargas spoke. We were answered in good Spanish. We had found that in the north all Indians spoke Spanish but many denied knowledge of their own tongue though we were informed by Peruvians that they did speak it. The present day centers of Indian culture are much farther to the south. This chap said, "Que linda la carreterita" or "it's a fine road." This was to bring us chuckles whenever we thought of it. Dr. Vargas had meanwhile discovered a new species of *Nicotiana* which pleased him as he had been on Dr. Goodspeed's earlier expedition to the south and had there found another new species.

As we dropped lower the road was more passable as drainage was better. When we got down to normal vegetation we paused to eat. Meals on the road generally consisted of a can of sardines with crackers and a bottle of soda pop to wash it down. One never drinks water unless it has been boiled. Typhoid is a lurking danger but there are other things that are worse. If one were unlucky enough to get sick only nature would be his doctor. Ascending a small knoll which surmounted a grassy slope I discovered another species of the group around *Echinocactus aurantiacus* at 2,700 meters. This, species, or perhaps variety, bore fewer spines and the ribs seemed broader and more round. After collecting three or four of them we drove on down the canyon. At another site, also a grassy knoll, I found several more. Some of the plants were quite discoid the tops hardly rising above the turf, others obviously much older were over 10 inches tall.

(To be continued)

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NOTICE TO AFFILIATES

There are now two sets of 100—35-mm colored slides each available to affiliates. The first set is composed of California Cacti and the second of Baja, South America and Mexican plants. Any affiliate interested in borrowing either set may do so by sending me a $5.00 deposit.

MARY GLADE, *Corresponding Sec'y.*
7600 Verdugo Crestline Dr.
Tujunga, California.

Morphology of Cactus Genera

1. Leuchtenbergia

By FRANZ BUXBAUM, *Judenburg, Austria*

Edited by E. B. Kurtz, Department of Botany and Range Ecology, University of Arizona

This series of short articles will present the morphological details, mostly previously unpublished, of the cactus genera. It is hoped that these articles will fill, partly at least, many of the gaps of knowledge which have prevented solution of the many systematic problems in the Cactaceae. They will undoubtedly be of interest and value to the amateur as well as to the specialist.

Leuchtenbergia is a well known monotypic genus of the Euechinocactineae, Linea Strombocacti (according to Buxbaum), or the Echinocactanae (according to Britton and Rose, etc.).

The external features (Fig. 63) of the plant (except the flower) have been rather well described by Britton and Rose, K. Schumann, and others. The root of *L. principis* is a large simple or branched tap root. It is derived from the primary root and the hypocotyl. The seedling is somewhat elongated and has large, triangular cotyledons (62-1ab). The podaria in the axils of the cotyledons are already elongated to very long tubercles which bear 3 to 5 papery spines in the areole at the obtuse top of the tubercle. Successively formed tubercles gradually become longer and more or less 3 or 4 angled. The angles of each tubercle are caused by pressure of adjacent tubercle primordia during the formation of the tubercle. The stem at first is completely covered with very long, angled tubercles which are erect when the plant is dry but are widely spread when the plant is growing. The tubercles bear a large amount of wool in their axils even though in *Leuchtenbergia* the growing point of the areole has not completely divided into a spine-bearing areole and a flower-bearing meristem. The wool in the axils, which was derived from the growing point of the tubercle primordium, indicates that the tissue in the axil is still meristematic. This fact also explains the occurrence of branches in old plants (Fig. 63). In this case, even though the old stem has lost all the tubercles and areoles, lateral shoots may be formed from the same active tissue which forms the wool in the axils of the tubercles.

The tubercles on old specimens are not 3-angled but rather are 4-angled and the upper surface at the apex of the tubercle is not flat but is truncate. As shown previously, all podaria or

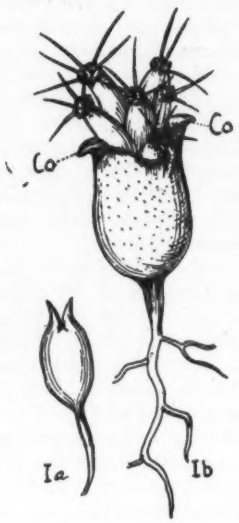


FIG. 62. Seedling of *L. principis*. (a) Just after germination. (b) Older seedling. (After Troll, from *Morphology of Cacti*, Part I, fig. 97 Iab)

tubercles of cacti are morphologically leaf bases and areoles are recaulescent axillary buds. Therefore in *Leuchtenbergia* it is not surprising that there is a small rudiment of a leaf blade at the tip of the tubercle (Figs. 64, 65). This fact is noteworthy since *Ariocarpus* also has a small blade below the areole on young tubercles. This blade later dies and falls off.

It is also known that the old tubercles of *Leuchtenbergia* gradually become dry and break away from the stem a little above their base. In this way a rather high naked stem results.

Flowers arise just above the areole of young well-developed tubercles (Fig. 64-4). A flower-bearing areole has three broad, papery, medial spines, the lowest of which is the strongest. Two lateral, papery spines arise, one on each side of the areole near the margin, just above the lowest medial spine. All of these spines are formed in the youngest areoles. Two more papery spines are formed by older areoles which are still not yet ready to produce flowers. These spines are smaller and shorter than the previously formed

FIG. 63. Old plant with lateral shoots from the naked stem. (By courtesy of R. Keller, Baden, Switzerland.)

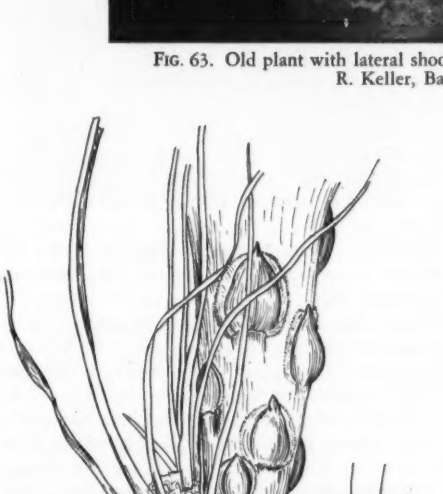


FIG. 64. (3) Front view of the top of the tubercle to show the rudiment (B) of a leaf blade. (4) Mode of insertion of the flower in the areole. (B) The leaf blade rudiment.

spines and they arise toward the middle of the areole between the second and uppermost medial spines. In a flower-bearing areole six more spines arise. One pair is small, short, and papery and arises slightly below the flower. Two thin papery spines arise near the margin (one on each side) of the upper part of the areole. A third pair of short subulate (awl-shaped) spines arises immediately below the flower.

The large flower (Fig. 66) is funnelform but a longitudinal section shows that nearly the whole cylindrical part of the flower is not the tube (receptacle) but rather is the pericarpel

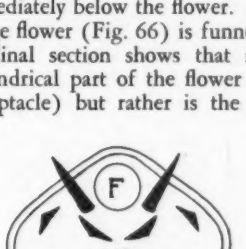


FIG. 65. Diagram of a flower-bearing areole. Dotted line indicates that part of the areole which is formed in young plants. Dashed line indicates that part of the areole which is formed in older, non-flowering plants. B—the blade rudiment. F—the point of flower insertion.

FIG. 66. External view of the flower.

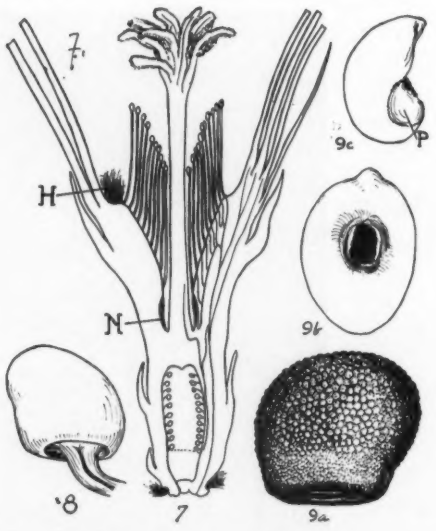


FIG. 67. (7) Longitudinal section of a flower. The vascular bundles are indicated in the right half of the drawing. N—nectary; H—areole hairs in the throat of the receptacle. (8) Ovule and funiculus. (9) Seed structure. (a) Lateral view. (b) Seed viewed from hilum end. (c) Seed after removal of the outer integument (seed coat). The thin inner seed coat still envelops the embryo and the perisperm (P).

("ovary") because it contains the large ovary-hole. Only the campanulate part of the flower can be called the receptacle (Fig. 67). The pericarpel bears many small scales with fimbriate margins. The lowest ones are nearly orbiculate and are very small. Progressing upward toward the receptacle the scales gradually become larger and elongate but they still possess a fimbriate margin. On the receptacle the scales are without the fimbriate margin and they gradually merge into the outer perianth segments. These lead to the larger inner perianth segments which are acute and somewhat serrate at the apex.

The ovary-hole, which is contained in the cylindrical part of the flower, does not possess ovules in the lower part of the chamber. Only the upper ovule-bearing part of the chamber is really the ovary, since the lowest part of the chamber is formed from the axial tissue of the pericarpel. This ovary structure causes the fruit to be open at the base when it is removed from the plant. In the literature the fruit is stated wrongly to dehisce by a basal pore (Fig. 67).

The campanulate receptacle is very fleshy. The lowest row of the very numerous stamens arises a few millimeters above the base of the receptacle. The tissue below the stamens consists of a nectary. Therefore a rather deep nectariferous furrow surrounds the base of the thick pistil. The inner surface of the receptacle is completely covered with stamens arranged in very dense rows. The fleshy receptacle being especially distinct at the second inner circle of perianth segments. Here the receptacle also bears long yellow areole hairs, just as in *Ferocactus hamatacanthus* and *Brasiliopuntia.* It is interesting to note that the areole hairs in *Leuchtenbergia* have not previously been described. At the first circle of perianth segments the top of the receptacle is less distinct and there are no areole hairs.

The stigma is rather primitive since it has a variable number of stigma lobes (9 to 12) and these are irregular in shape and are not distinctly separate from the style.

A prominent margin surrounds the end of the short, naked and simple funiculus where it attaches to the ovule (67-8). Since the margin is formed from the outer integument, the mature seed also possesses this character (67-9a). The seed is very large (about 2 mm.) and nearly spherical except for a low crest on the front (hilum end) side (67-9b). Since the hilum is surrounded by the broad margin of the seed coat, the hilum is quite deep and no micropyle is visible. In the hole of the hilum the remnant of the funiculus forms a small ring of dry tissue. The nearly black seed coat is verrucose. If the outer seed coat is removed (67-9c) we then see the succulent curved embryo and a small but distinct perisperm which is conected to the inner seed coat.

MORPHOLOGY OF CACTUS GENERA

By WM. MASTRANGEL, *Rocking Horse Cactus Gardens*

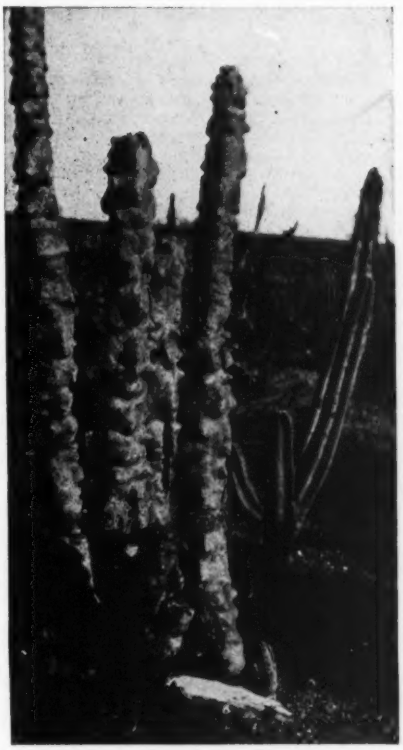


FIG. 68. Totem Pole Cactus introduced 25 years ago by Howard E. Gates.

One of the most interesting and oddest cactus plants is the well known favorite—the Totem Pole Cactus, scientifically called *Lophocereus Schottii* var. *monstrosus*. This strange plant, which hails from Mexico's states of Sonora and the southern part of Baja California, has the most interesting growth, we believe, of all cactus plants.

It is completely spineless, with large irregular bumps or knobs all over the plant body, on top of which are the areoles. Oddly enough, regardless of its crooked and irregular growth, the plant itself usually grows quite erect and tall—up to eighteen feet. Similar to other Lophocerei, it branches from the lower parts of the main stem. A grown specimen is indeed a most interesting feast for the eyes. As per its appropriate name, the Totem Pole, it truly does resemble the intricate carvings of the Indian totem pole artists. One can almost visualize the savage faces here and there on the plant.

The Totem Pole grows in two distinct forms: the first, form *Mieckleyanus*, which is the slender one having low, rounded warts; the other form has a main stem which measures three inches or more in diameter; forma *Mieckleyanus* (the slender totem pole) has a main stem diameter of approximately one and three quarters inches to two and one-half inches.

The Totem Pole cactus grows very easily on its own roots from cuttings which generally take root in about six weeks, if planted in slightly damp sand. At first its rate of growth is fairly slow but after the roots have been well established in the course of about two years or so, the plant will grow quite rapidly if left undisturbed. In fact, I have observed a six foot plant that grew fourteen inches in height in one year's time—normal soil and normal watering. We checked this growth by placing the potted plant next to a tall pole in the spring and putting a mark on the pole by the tip of the plant and then marking its rate of growth in November of the same year. After this cactus (which does not look like a cactus at all) is several feet tall, it will start to branch near the base, provided it gets enough water to make this extra growth. The offsets start their growth in early spring and usually by the end of the growing season they are large enough for cuttings. Offsets should be approximately five or six inches in length to be successfully used for propagation stock. They can be cut off neatly from the main plant with a sharp knife in December, and then placed in a shaded, cool spot until March or April—at which time they may be planted in the sand bed for rooting. Soil is not too important, just so long as it is well drained. Water this plant just the same as you would any hardy *Mammillaria*. Give it some shade and plenty of light and filtered sun. Too much shade causes etiolation. The Totem Pole cactus, although not common, can be purchased from several commercial cactus gardens here in the United States. Strangely enough, I have never seen it listed in any of the Mexican catalogues.

In the last three issues of this JOURNAL, we have discussed our three favorite cactus plants—the best selling Mexican Old Man Cactus, the beautiful red Arizona Rainbow and the elegant Golden Ball Cactus. With these three beautiful plants and the Totem Pole added to them, a collector can have (to our mind) four of the most beautiful and interesting cactus plants ever found in a collection.

While the Totem Pole is not the most beautiful plant in the world, it is one of nature's strangest, and most fascinating plants.

Next issue—The Bishop's Cap Cactus.

MORE ABOUT MEXICO

By HOWARD E. GATES

Photos by E. YALE DAWSON

My article published in last year's Cactus and Succulent Journals, was of a trip made in October and November of 1951. This article concerns a more extensive trip made in May and June of 1952 in the company of Dr. E. Yale Dawson. Portions of this journey which were duplicated in the earlier account, will be omitted or passed over lightly.

There was a vast difference in the scenic beauties of the two trips. The first was at the close of the summer rainy season when streams were running merrily, the trees were all green and there were wild flowers everywhere. Apparently during our winter months there was no rain at any of the places we visited except on the east slope of the great mountain range facing the Gulf of Mexico. Consequently in most places the grass was cropped to the ground and many of the trees were leafless. Most of the cactus do not wait for the rains but blossom in the spring and mature their fruits early in the rainy season. The leafless condition of so many trees made the cactus visible at greater distances so it was easier to find what we wanted to see. The presence of cactus flowers and fruits greatly facilitated our studies of the various kinds.

Our journey to Mexico City was accomplished over the central highland route from El Paso via Chihuahua, Durango and Queretaro. We merely passed through these cities. In Mexico City, we had pleasant visits with Dr. Helia Bravo and several of the cactus enthusiasts. A pleasant evening was spent in showing them kodachromes of Lower California, which place none of them had every visited. We learned that the environs of Mexico City are not good for growing the larger types of cacti. It is not too cold as there are seldom killing winter frosts. On account of the high altitude and the cooling rains, the summer weather is not warm enough to induce a good growth. While caring for our own Mexican plants, it would be well to remember that the winters are dry and in the giant cactus regions, the summers are hot and often rainy. As in most places that have summer rains, it really rains when it does at all.

In the heart of Mexico City is a large park covering more than ten city blocks called the Alameda. Across the street to the north of it, is the funeral flower market, a couple of blocks long. Here the designs and casket sprays are made on an assembly line basis as there are workers performing many different operaitons from the nailing together of the frames in the rear to the selling of the finished products at the sidewalk line. The two principal set designs are wreaths and crosses which appear to be made only in jumbo sizes about six feet across. Apparently they are not made to order, but are made ready and the buyer picks out the one he wants. Delivery is usually accomplished by tying them, back down, on top of a sedan automobile. Sometimes, a youth on a bicycle, will carry one while threading his way through dense traffic. Aside from the wreath and cross designs, nearly all other funeral flowers were arranged in casket sprays three or four feet long. Among the flowers used are gladiolus, carnations, daisies, violets, roses, hydrangeas, gardenias, and orchids.

From Mexico City our route was eastward over the ten thousand foot pass at Rio Frio on the Puebla road. As the highway turned south on the eastern side, we had splendid clear views of Popocateptl's nearly eighteen thousand foot cone. During the dry winter, the heavy snow cap we saw in the autumn, had retreated to a point away above the timber line on the north and had almost disappeared on the southern face. A little to the north was the more massive but nearly as high Ixtaccihuatl usually known as the "Sleeping Woman." From her feet on the south toward Popo, the lines of the summit ridge gradually rise to the high point of her breasts, then drop a bit before forming her head with her hair streaming down the mountain side to the north. These two mountains are a majestic sight at any season.

We did not enter the city of Puebla but turned off at Cholula and wound between its three hundred and sixty-five churches on a short cut to the Christopher Columbus Highway which goes on to the border of Guatemala. It was not long before we reached an elevations low enough for the giant types of cactus. The most striking of the first group to appear was *Lemaireocereus weberi,* truly a giant amongst the giants. Numerous massive branches appear on the stout trunks at heights of six or eight feet. These turn directly upward as soon as they have cleared the older branches, then further branches will arise from the base of these branches. So gigantic are these plants, that the farmers often cut away the inner branches, leaving only the outer ring and use the resulting platform as a hay mow or granary where the feed is out of the reach of hungry cows, burros and goats. The fruits are two or more inches in diameter and edible after the heavy growth of spines has been removed. Near all the towns and villages were other species of *Lemaireocereus* which are grown for their fruits.

The next really notable one to appear was *Cephalocereus mezcalaensis,* now called by some *Neobuxbaumia mezcalaensis.* It is not a plant of general distribution but is found in localized colonies over a wide territory. Usually the plants appear as massive, fluted, single, green columns arising to a height of about thirty feet. The nocturnal white flowers are campanulate, two to three inches wide, with reddish external longitudinal stripes. They appear at various points almost from the bottom to the top of the plant. The fruits are stout spindle shaped, green, tuberculate with weak bristles taking the place of spines. When ripe, the fruits split from the blossom end, usually into five segments which curl outward and backward until the inner white surfaces could easily be taken for flower petals. The dark brown to black seeds are embedded in a stringy white mass. Surely this cannot be a *Cephalocereus* for there is no sign of a cephalium. The fruits are widely scattered instead of localized, tuberculate instead of smooth and stringy rather than pulpy fleshed. Undoubtedly this plant deserves a new classification and possibly Backeberg's genus *Neobuxbaumia* is the proper place for it.

Close to the village plaza is usually the public market. This is a colorful place and always worth looking over. Everything locally needed for human existence may be found in some corner of the market. In one market we bought bread in the shape of broad, flat picnic buns that had been baked in a dome shaped oven. These ovens are heated by burning wood within them which is raked out when the oven is hot and before placing the loaves to bake. The loaves are brought to market packed in great woven wicker baskets with broad green leaves packed in the open tops to preserve freshness and keep out dust. The kinds of cactus that are locally in fruit may usually be determined by observing the offerings of the neighbor-

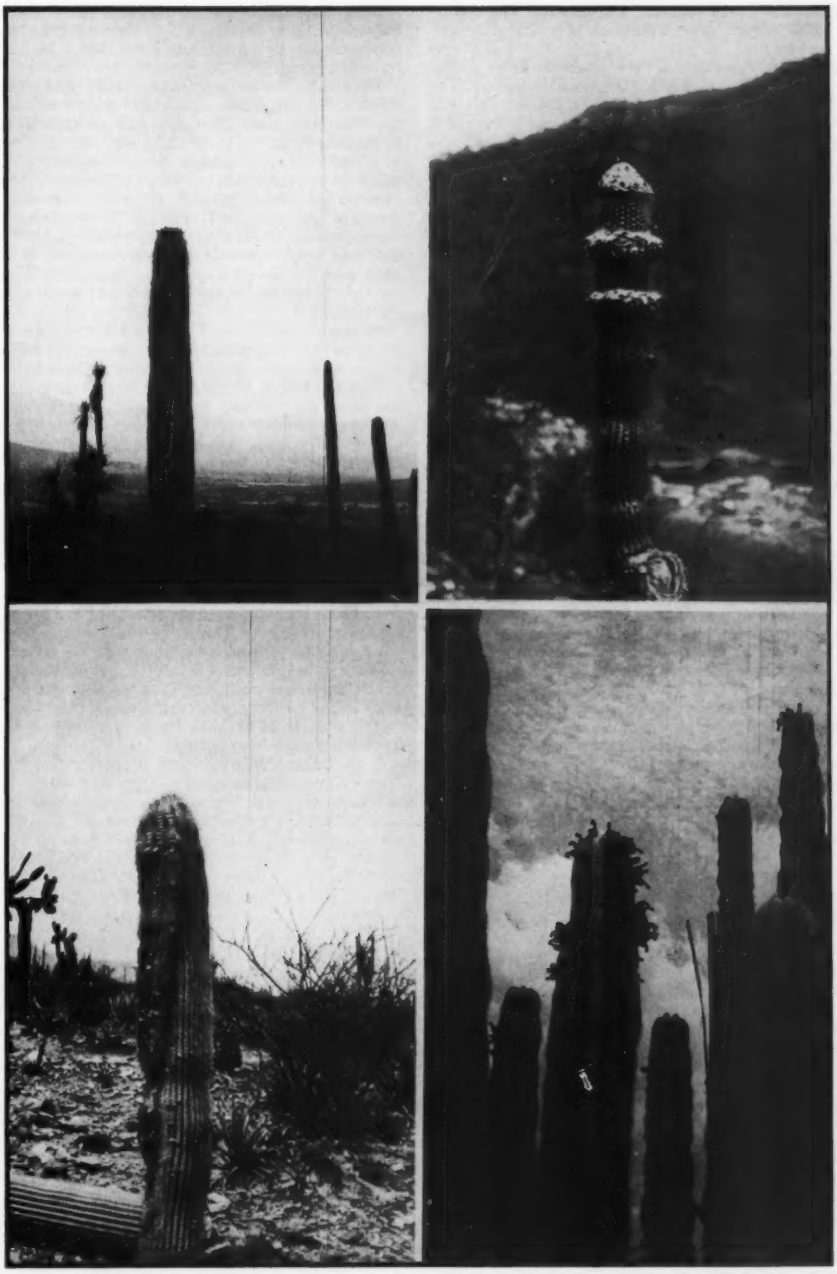


FIG. 69. (Upper left) *Cephalocereus macrocephalus* in fruit, west of Zapotitlan de las Salinas, Puebla, Mexico. (Upper right) Cephalium of *Cephalocereus apicicephalium*. (Lower left) Cephalium of *Cephalocereus hoppenstedtii*. West of Zapotitlan de las Salinas, Pubela. (Lower right) *Lemaireocereus dumortieri* in fruit near Venados.

hood farmers in the market. Dr. Dawson had a commission to secure large quantities of colorful beetles to be embedded in plastic articles. He found the markets more fruitful than the roadside fields as the beetles were often on sale for medicinal purposes. The markets appear to be social gathering places as well as sources of supply. They varied from place to place, both in the types of produce being offered and the costumes of the people. There were places where both men and women wore palm leaf hats of the same design. Others where the women were bare headed or wore head shawls. In some localities many wore shoes, others sandals and in still others everyone was barefooted.

A profitable trip to Mexico could be made for the single purpose of photographing the many types of homes. The well to do often live in homes of cut stone or brick, either adobe or burned. These homes are roofed with tile ridges or sometimes flat. The walls may be stuccoed in many tints or left with the exposed earthen colored adobe. In this section we found many country homes built entirely of palm leaf thatch. In the pine forests they were built of sawed lumber or of logs. Very humble homes and shelters beside the fields were roofed with overlapping agave leaves put on in shingle fashion.

A large portion of our journey from Cholula to Oaxaca and then on to Tehuantepec, was through and over territory that was impassable until about five years ago, to anything except a burro train. The many rugged mountain ranges in this section go in various directions instead of forming any sort of a regular pattern. Consequently we were nearly always going up or down. In the lower elevations were usually some giant cactus, a rather heavy growth of tropical thorn forest and some larger trees including the widely scattered kapok. There were few places that could really be called tropical jungle even though in the summer and fall, everything is damp, lush and green. The dry winters cause the herbage to die and the leaves to drop on many kinds of trees, so that late in the spring much of the lowlands and moderate elevations were open thorn forest types. The most interesting of the larger *Cerei* are not found on the real lowlands but in an intermediate zone ranging from two to five thousand feet in elevation. Then above these is an oak forest belt in which are found numerous species of Mexico's more than two hundred kinds of oaks. It was most interesting to me to find that the most abundant stands of orchids were in the oak belt and that most orchids occur in territories with definite dry spells. Sometimes above the oak belts were narrow juniper belts and always at still higher elevations were forests of pines. Large cactus were scarce in the oak belts and non-existent in the pine forests.

The Mexican likes to farm the hillsides. In places these are so steep, it looks as though the farmer must hang on with one hand while he wields the hoe with the other. These hillside farms erode and wear out so the farmer must often move to another location. To get a new location, he first cuts down the large trees and then burns the brush which process destroys the humus that has taken hundreds of years to accumulate. North of Oaxaca is a large area of eroded land which once supported a large population but is now practically abandoned. Next to fire, the most destructive agents are the herds of goats which eat up or trample out many of the smaller plants. Even in the sparsely settled districts, goat damage has been tremendous.

Mexico is a land of contrasts. Great diesel trucks speed by human packers using head straps to enable them to carry heavy loads to town. In some sections large farming operations are performed with the most modern of machinery. Here on the road to Oaxaca we found farmers cutting wheat with a sickle, tying it into bundles by hand, carrying the bundles on burros' backs to threshing floors where the grain was trampled out by burros and then tossed in the wind for winnowing.

Eventually we arrived in the valley that surrounds Oaxaca. To avoid the narrow and congested streets of the cities the national highway department is wisely by-passing them in its new highway construction. The by-pass at Oaxaca swings up on the side of a hill which gave us magnificent views of the city, the valley and the mountains beyond. Over all were masses of threatening storm clouds, so after hunting successfully for some elusive gasoline, we hurried on up the valley and over a high mesa. We never out ran the storm until we were over the mesa and well down the grade beyond. There we set up our tent and made camp for the night.

In the morning, we found we were high on the banks of the rugged canyon of one of the tributaries of the Tehuantepec River which we followed for quite a distance before climbing over another great ridge and some smaller ones before going down again into the main canyon towards Tehuantepec. In many places the highway was cut through solid rock on the mountain side. In the bottom quite a stream of water flowed between the sandy banks and villages were built wherever there was any farm land.

In this canyon we came upon some immense specimens of *Pachycereus grandis*. Possibly some *Pachycereus pringlei* of Lower California match this for sheer massiveness. The great branches arose very erect from the six to ten foot trunk. Near the tops were the typical Pachycereus fruit which looks like a chestnut burr. North of Oaxaca we had found plants of *Cephalocereus chrysacanthus* but here we found what appears to be another kind. It has more slender and taller branches rising from a short trunk with whiter wool in the fruiting portions. I'm not going to try to say what it is at present but it is worthy of further study on my next trip.

It might be well to say at this point, that it is my impression that the genus *Cephalocereus* of Britton and Rose must eventually be broken up into several genera. *Cephalocereus senilis* was chosen as the type species of this group and I have seen nothing in Mexico that closely resembles it except *Cephalocereus hoppenstedtii*. *C. senilis* has a comparatively small flower, flesh to pink in color followed by a small top shaped fruit. There is a more numerous *Pilocereus* group including *Cephalocereus palmeri, collinsii, chrysacanthus,* and others which have a much larger, more open pink flower followed by broad flattened fruits of dark red to purplish colors with reddish purple flesh. All of this group have a much depressed apical center and may be said to have a flattened apple shape. Then there are types of Cephalocereus falling into other groups which will be mentioned as we come to them in this account of our journey.

We came across many colonies of the plant variously called *Cephalocereus* and *Pilocereus tetetzo*. The stout, tall columns rising above the small trees bore rings of top shaped fruits near the tips. Since Dr. Dawson has made mention of these in our JOURNAL (Vol. XXIV, page 176) under the name of *Neobuxbaumia tetetzo*, I will pass on. Often growing with these were colonies of an un-identified globular white Mammillaria.

To be continued

CONVENTIONEERS

Be sure to attend the Convention in July and hear the wierd tales of Howard Gates and Gil Tegelberg who are still sojourning in Mexico. It will be worth coming 3000 miles to listen to them!

CACTUS IN THE BIG CITY

I have been reading our Cactus and Succulent Journal avidly for the past few years and pictures therein of the many outdoor gardens and hothouses with their accompanying articles have filled me with envy and frustration. But now I think the time is ripe for us metropolitan cactus fanciers to rid ourselves of our sense of inferiority. After all, anyone can raise cactus if he happens to live in a region closely approximating the natural environment of the cactus, or if he happens to have the space to build a greenhouse where he can artificially create such an environment.

But what of the cactophile who lives in the heart of a big city where a cactus looks about as out of place as a sun-lamp in the desert? There has been very little printed in our Journal about the trials and t ribulations of a metropolitan cactus lover. I have been growing cacti in my New York apartment for the past five years so I feel fairly qualified to take to the typewriter in behalf of my neglected big city brethren.

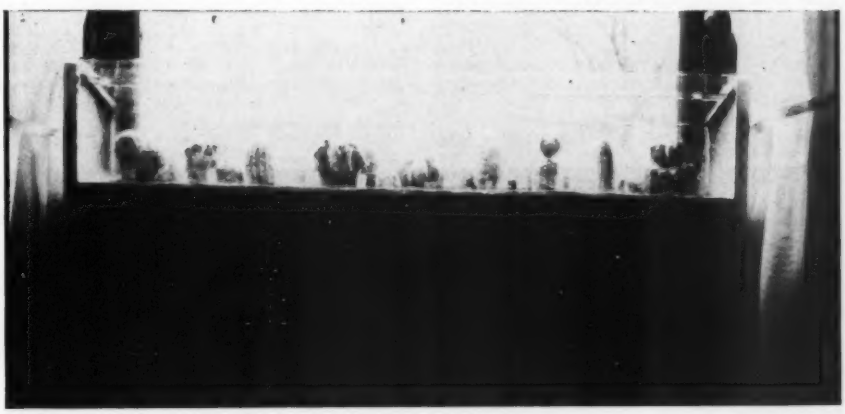
I live in one of New York's largest housing developments, a pleasure shared by some 7,954 other families, located just a few minutes ride from Times Square, Radio City, The United Nations Headquarters, to mention just a few of my neighbors. I mention this just to let you know that any sizeable amount of open space can be seen only by looking in one direction—directly upward! Luckily my apartment is 14 floors up (top floor) and has a southern exposure that is not blocked by any other buildings. With four good sized windows my collection of cactus is limited only by the amount of available sill space and my wife's tolerance.

Into those four windows, along with a goodly amount of the necessary sunlight, comes flying soot from our Stuyvesant Town incinerators and from the mightly smoke stacks of the Edison power plant just a few blocks away on the East River. Gasoline fumes are wafted upwards from the busy streets below us. Icy wintry blasts reach their cold fingers towards our precious plants. Their vitality is sapped by the dryness of the air in our overheated rooms. But comes Spring and the miracle of Nature asserts itself once more—plants come to life—buds break through—and then the flowers!

It always seems amazing to me that cacti can live and flourish and be brought to flower in such alien surroundings. I have at present about 60 plants, a good many of which have flowered for me. Good soil, good drainage, and extreme care in watering would seem to be the requisites along with a constant lookout for insect pests—mealy bug and red spider mites being the chief offenders.

Yes, my cacti look mighty good to me. Maybe I ought to get a few new ones this year. Let's see now, where's Johnson's catalogue? But I can see the lady of the house glaring at me with that "don't you dare" look. Oh well, If I only had a greenhouse. . . .

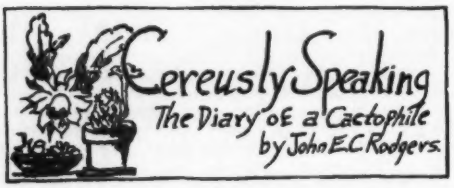
JOSEPH EMMA
New York 9, N. Y.



A NEW WINDOW GREENHOUSE

The pictured window greenhouse just fits in the window frame. Its measures are 29½″ long, 8″ wide x 7″ high (in the front) and 10½″ high (in the rear). This window greenhouse will not violate any city building code because it is not hanging out on the street. The wooden lower part is ¾″ pine wood, with 1 coat of boiled linseed oil, 2 coats of flat-paint and 1 coat outside-enamel paint. The corners are aluminum in which the double thick glass plates are cemented. Therefore the house is giving no shade. The bottom, for reason of durability, is aluminum. 2 rows of 1/16″ holes were drilled in the front part toward the street. Surplus water is dripping on the window sill and not on the floor of the room. Two nails in the window sash prevent the crushing of the glass by stopping the windows to slide too far down. The narrow space between the glass and the window rail is no cause for a draft. In winter the storm window gives an additional protection for the plants in the greenhouse and eliminates drafts. The wooden part is filled with soil and the cacti are freely planted therein. The greenhouse can be stocked with 20 middle-sized cacti and is beautifying the apartment tremendously. The cost of material here in New York is only $5.00 for years of pleasure and fun.

CURT F. W. LIEBE, *New York City*



Lower temperatures, limited waterings cause defoliation of *Pereskia, Pereskiopsis* and other leafy members of Tribe I of the Pereskieae. Only good light, steady warmth and plenty of water can get the *fast-grown, hardened-shoots* to bloom. I've had *P. Bleo* and *P. cassytha* bloom once or twice. If you expect leaves and new growth the year around water regularly. Keep them moist and warm. Since I do not want mine to become viney all over the place, I let mine rest in the storage room. There are a few that are leafing out in buckets which contain *Datura arborea* (double angel trumpets). Most collectors and window gardeners think the *Pereskia Pereskiopsis,* etc., are not interesting but once they have seen the foliage (and blooms), they would have at least one of them to add variety.

I keep as many as I can secure (originally I used them to quick-job grafting operations after sharpening). They bloom in late spring and early summer. The flowers look like single roses only they proliferate—one comes out of the side of the other of both buds and blooms. I have two seedlings (*P. Conzattii* and *babiensis*). They grow in a tropically-controlled, moist germinating soil into sturdy plants when kept warm and moist the same as when germinating. The transition from the cotyledon stage into the leafy type is a revelation of the past history of the most primitive cactaceae now in existence.

The rarer Opuntias are growing from the tips, base and trunks of the ones I have. *O. basilaris* has 3 new stems from the base as it seldom, if ever, grows one on top of the other. *O. santa-rita* (wine red-purple in sun) is beautiful but only small growth "buds" started. *O. papyracantha, O. boliviana, O. brasiliensis, O. teres, O. tetracantha, O. verschaffettii, O. vilis, O. erectoclada, O. nivelleri,* and *Opuntia vestita* have been delighted with the cool, dry culture of this winter. And all are responding with new growth. Opuntias (inside types) do not bloom for me as a rule.

Most of these along with my southwesterns wintered near the glass. *Echinocereii* (*reichenbachii, rigidissimus, pectinatus* and *viridiflorus*), *Hamatocactus setispinus* and *hamatacantha. Thelocactus* (*bicolor, lloydii* and *pottsii*) have "bud-eyes" showing. These were all in the best light, good ventilation and coolness (with limited waterings) that I could provide. So far about 2 out of every 3 plants I have hanging from the mullions and on high shelves have bloomed, or are budded.

The Aloes did not respond as well as I had expected. They grew all summer and "slowed up" as in other years. Not one has shown buds of the "regulars." The storage place is the same as before. The only difference is in the 5° cooler temperature and the added dryness. They may be going to bloom late (I've had them set buds in December and bloom as late as June) but buds should be showing up by now. The same is true of the larger Haworthias and Gasterias which I stored on the ground under the benches. When I had fewer plants I kept them in a warmer location, repotted them oftener and always had plenty of blooms on all three genera. The stems are beautiful, it is true, so if you do not want the blooms the treatment I've given mine is acceptable. My smaller, rarer Haworthias, Gasterias, and Aloes are in warmer, moister positions to keep them growing. Most of the Haworthias have bloomed.

To be continued

FIG. 70. Can you find a description of this plant in Britton and Rose? Who can name the cactus?

SPINE CHATS

LADISLAUS CUTAK

Kenya Colony in British East Africa has received notoriety in newspapers throughout the country in recent months because of the dreaded Mau Mau massacres. Sizeable sections of the Colony are set apart for European development and private enterprise has a wide range. Farms grow wheat and other grains, pyrethrum flowers for insecticides, sisal; there are tea and coffee plantations and pastures for dairy herds, beef cattle, and sheep. Much of the region is occupied by the populous Kikuyu tribe and among these natives the secret Mau Mau society for the expulsion of the whites operates.

G. W. Reynolds, the noted Aloe authority, describes four new Aloes from Kenya Colony in the January, 1953, issue of The Journal of South African Botany. He travelled 3,300 miles in six weeks in early 1952, visiting all the Aloe type localities in Tanganyika, Uganda and Kenya, gathering information on the earliest described Aloes and discovering several new species which are to be described in the near future. The first four new Aloes emanating from Kenya are *A. ballyi, A. kedongensis, A. ngobitensis* and *A. graminicola.* The first is a very distinctive species with a tall slender simple stem reaching 20 feet and more in height. Its leaves and sap give off a permeating, very decided odour of rats or mice. The second Aloe grows in dense masses, sometimes forming untidy impenetrable thickets up to 12 feet high and several yards across. The third Aloe is distinguished by its remarkable color of the flowers which are a striking and most attractive bright sheeny orange-scarlet, the perianth being usually minutely white-spotted. The last Aloe was found growing in grasslands, which suggested the specific epithet, and has smaller, denser, capitate racemes of much narrower more curved flowers than its closest relative, *A. lateritia.*

In another article in the same issue G. W. Reynolds writes about his investigations of *Aloe secundiflora,* whose identity can now be established with certainty. Two other Aloes, *A. engleri* and *A. floramaculata* became involved in the investigation and on examination revealed that they were, in all characters, identical with *A. secundiflora,* so that both of the names must now go into synonymy.

* * *

While on the subject of new succulent plants we might mention a few others which have come to our notice recently. Merxmüller describes one new species and one subspecies of Crassula and Suessenguth describes a new variety of Euphorbia in Mitteilungen der Botanischen Staatssammlung München (Heft 3, Juni 1951). *Crassula guchabensis* is a graceful perennial herb with simple more or less flexuous stem and rosulate orbicular-ovate leaves and a thyrsoid spike. It is native to Southwest Africa and is allied to *Crassula nodulosa.* The new subspecies, *Crassula pharnaceoides* ssp. *rhodesica,* is a small fleshy erect herb growing in shade of *Mopane* clumps; with Coleus, Ceropegia and Cyanotis as companions. This subspecies comes from Southern Rhodesia. *Euphorbia rubriflora* var. *simplex* grows on granite kopjes in the Rhodesian countryside.

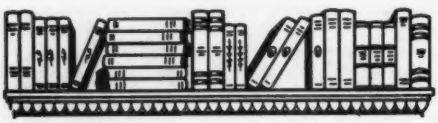
At the recent Dallas Garden Center Flower Show a tree was designed by Viggo Larsen constructed of strips of Arizona cactus and about 500 white carnations adorned it. The flowers were held in water containers covered with moss and fastened to the tree.

* * *

In Irvine's PLANTS OF THE GOLD COAST the cosmopolitan *Bryophyllum pinnatum* is suspected of having a malevolent character or influence and is much used in fetish practices, partly because it does not die in the dry season. The leaves are put in water and the liquid is then used in sprinkling on fetish objects. The leaves are also used in native medicine to cure sore eyes. Another use for the leaves is as spoons for feeding babies with water or other liquids.

* * *

As you know the fifth biennial Cactus Convention of the Cactus and Succulent Society of America, Inc., will be held in Southern California in July. Chairman Howard Gates has been very busy preparing an interesting program. All of us expect this fifth national gathering of cactophiles to be the best and largest on record since it will be held in the heart of the cactus world. It is at conventions like ours that cactus people convene from all parts of the world to exchange cultural ideas, to converse with the experts in their special field, and to view beautiful color pictures and listen to interesting discourses on all phases of our hobby. Besides the serious aspects of the general program there is also a lighter bill of fare offered by the fun session which includes the crowning of the cactus king and queen, initiation of new members into the Ancient Order of Cactus Nuts, and hilarious contests of various kinds. The fun session was proposed at our meeting in Cincinnati in 1947 and inaugurated in Phoenix in 1949. It was accepted wholeheartedly by everyone in attendance. The initiation rites were a bedlam of laughter and fun in Denver in 1951. It is hoped that the color movies taken on the fun session will be available for showing in California. I have been in charge of the fun session since its inception and all of you must realize that it is rather difficult to come up with new ideas each time. Take this into consideration and if you have any new stunts to suggest, please let me have them for consideration as soon as possible. Mail will reach me at the Missouri Botanical Garden, St. Louis 10, Mo. Our lovely Queen Pat Moorten is busily engaged in designing new things for the coronation ceremony and from all indications our cactus coronation is destined to out-coronation the much publicized British show. There will be another hat contest for the ladies utilizing cacti and succulents as decorative material. Make a practical as well as a funny hat. We'll try to get the men model some of them as we did in Denver. There will also be a 'loud shirt' contest for the men. Decorate your shirt with cactus motifs—the louder the better. I designed a new initiation certificate which will be distributed to all members in attendance. Don't forget to send me your suggestions and by all means PLAN TO BE WITH US IN JULY.



"DIE STACHLIGE WILDNIS." This excellent and very interesting book, written by Curt Backeberg, should be in the library of every cactophile who reads the German language. His descriptions of the search for new species in the wilds of Tropical America sounds like a tale out of a strange world; the numerous photographs are excellent and his humor in describing the adventures is unique. Backeberg has written many books about cacti and has contributed to many magazines. But in "Die Stachlige Wildnis" he has given us a volume of particular charm well illustrated with 123 photos of cacti and other subjects. Here you travel with him through desert, mountain and valley. You discover the prickly plants in their native habitats, and become acquainted with them and the whole cactus world. And—like so many others have done before you—you will fall in love with these fabulous plants, and find in your own cactus garden a refuge to give you perspective, strength and inner peace.—HENRY FREISE.

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